FLIGHT & The AIRCRAFT ENGINEER.

First Aero Weekly in the World.

Founder and Editor: STANLEY SPOONER.

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport.

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NOTICE OF REMOVAL.

The Offices—Editorial and Advertisement—of "FLIGHT and The Aircraft Engineer" on November 10th will be removed to more convenient premises at

36, GREAT QUEEN STREET, KINGSWAY, W.C. 2.

The telephone number remains Gerrard 1828, and the telegraphic address is Truditur, Westcent, London.

All communications should therefore, as from and including November 10th, be addressed to

36, Great Queen Street,
Kingsway,
London, W.C. 2.

EDITORIAL COMMENT.

"One Air Service; One Uniform; One Badge."

BUT of the mass of correspondence we have from time to time received bearing on this subject, we have not, until this week, been told by anyone in either Service—and our correspondents have included many officers of the R.N.A.S. and the R.F.C.—that the surest way to ruin the flying service is to make of the two a single indivisible body. On the contrary, the consensus of Service opinion has appeared to be that it will be an excellent thing all round when at last the Imperial Air Service has a separate and concrete existence. At the very eleventh hour, however, we have received a very grave warning from a correspondent, who does not vouchsafe his name but who signs himself "Flight Sub-Lieutenant." He says he has read all our articles on the subject, and now really feels that he must give us the general opinion of the men belonging to the *active* branches of both Services. He says that the Imperial Air Service is the most unpopular thing of the times—we quote his own words—in both Air Services. A large proportion of the flying men feel that not only would such an amalgamation be unsatisfactory, but it would be "a ruin of our Air Services in general." He goes on to say that he does not personally go so far as this, but he is sure it will be a great mistake and will cause no end of dissatisfaction. He ends with the entirely gratuitous assumption that "the man who writes your articles probably knows nothing at all about the active part of the Service." As to this last, we can reassure our correspondent at once—"the man who writes our articles" *does* know something about the active part of the Service. Such presumptions as this are merely impertinences and are totally uncalled for in serious correspondence.

We should not have taken any notice of the letter at all, only that it is of passing interest to note that there is a small minority of very junior officers who, for reasons entirely personal to themselves, are against a change in administration which is dictated by motives which are probably above the heads of this minority. We do not doubt for a moment that there will be some small amount of dissatisfaction among a certain section of the *personnel* of both Flying Services. There never was a change consummated yet that met with absolutely unanimous approval, so that we have never anticipated that the change from the dual to the single in the Air

Service would please everybody. However, the minority, among whom our correspondent numbers himself, may lay it to heart that the new scheme has only been brought to practical fruition after the most careful study and examination by men who have given the case very thoughtful consideration from every angle of view. They have, wisely as we believe, decided that it is in the best interests of the Empire that we should have a single Air Service and, that being so, we see nothing for it but that our young friend "Flight Sub-Lieutenant" should pocket his annoyance and get on with his share of winning the war. He need not be afraid of the ruin he anticipates—all will be well if he and those who think with him will have a little patience while things work themselves out.

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The Growth of the Services. For reasons that are sufficiently obvious, very few details have been allowed to transpire regarding the expansion of the Air Services since the outbreak of war. Even the worst informed, however, know that the aerial arm has grown to dimensions that are relatively to its size three years years ago colossal, while even those who are closely in touch with its development are not always able to appreciate the exact ratio of expansion. The figures given by the First Lord of the Admiralty with reference to the growth of the R.N.A.S. during the war are, therefore, of more than ordinary interest. He told the House of Commons that the service which, at the beginning of the war, consisted of 700 officers and men has increased to a *personnel* of 41,000. Its duties, as Sir Eric Geddes pointed out to the House, are varied, of great value and of absorbing interest. Its airships and seaplanes are the terror of the enemy submarine. During a single month the aircraft patrol round the British coast alone is more than five times the circumference of the earth. During the month of September 64 raids were carried out on dockyards, naval depots, aerodromes and other objects of military importance in Flanders beyond the enemy lines. No fewer than 2,736 bombs were dropped by the R.N.A.S., totalling 85 tons of explosives. There is no doubt, he said, that these raids result in great material and moral damage, and on many occasions their effect is shown in the aerial photographs to be such as to hamper and restrict seriously the enemy naval, military and aerial undertakings.

These figures, incomplete and to some extent tantalising as they are, nevertheless throw a strong light on the vast importance to which the war in the air has attained, and on the unexampled growth of the British aerial arm. In taking these figures into account we must bear in mind that they have no reference at all to the growth of the R.F.C., the "military wing," which has probably been even greater than that of its sister service. If the statistics were available they would give the ordinary citizen furiously to think. Certainly they would tend to drive home the lesson we have so constantly preached upon—that the future and the safety of the British Empire lie as much in the air as on the sea. We cannot have the full figures until the war is over and done with, but when at long last they are available for study they will prove to be more convincing of the truth of our thesis than even those who are closely in touch with the movement dream of now. Imagine what it means! Before the war aircraft were regarded as being more or less in the way of scientific toys. They approached the practical, but even among serious students of war there was a cleavage of opinion as to the exact measure of their use. So that we might not be altogether unprepared, a certain number of aircraft were supplied to our fighting services and, thanks to the prevision of men like Mr. Churchill and Commodore Sueter, the Navy had a very useful nucleus Air Service. Under the stress of war that nucleus has been expanded in its *personnel* alone nearly 600 per cent. By what percentage its material has increased we do not know and are not likely to be told, but we may be very sure the ratio of increase is not lower than that which applies to the *personnel*. And then to these encouraging figures we have to add those relating to the R.F.C. which, in all probability are, as we have said, higher still in relation to the pre-war establishment. True, other branches of the fighting services have grown correspondingly, but we have to remember that in their case the expansion has been more normal, so to say. That is, we have increased the number of our infantry battalions, for example, in proportion to the magnitude of the war in which we are engaged. That, of course, is equally true of aircraft but with this difference, that in former times wars were decided by the infantry, which was an ancient and well-tried arm, while the air services are the creation of this war and have passed from the hobby of the enthusiasts to the decisive factor in great battles. The more one regards the subject, the more is conviction emphasised that the mastery of air means everything to the future of the Empire and the more is one inclined to be thankful that at last the realisation of this has come home to those in authority.

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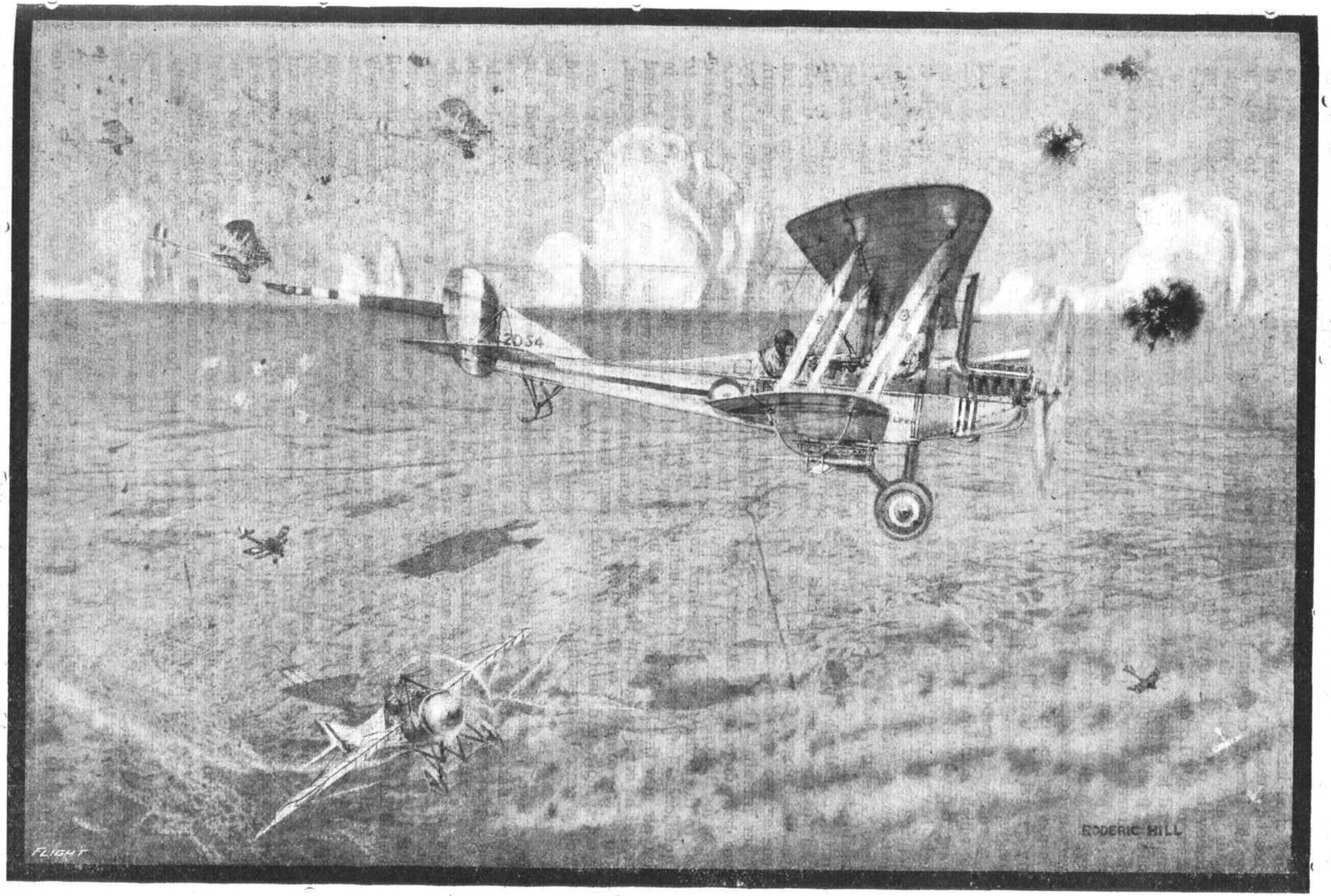
The Raids on London. Major-General Ashmore, who is responsible for the defences of London, had one or two interesting things to say at the opening of the Air Services Exhibition at Mile End last week. He remarked that London was now as much a part of the battlefront as any town on the Continent and that the Germans come, and will continue to come, as often and in as great strength as they could. The effect of the arrangements for defence was that of the German aircraft which came over, nine-tenths failed to reach their objective. We cannot, he said, make it certain yet that no German machine could reach a great place like London. If we had all the guns, lights and machines in the world we could not prevent this—at present. (We fully grasp the gallant General's meaning, but supposing, as he said, we had *all the machines in the world*—) On the occasion of the last raid seven attacks were made, six of which were stopped by the barrage and other defensive arrangements. In the seventh attack, two, or at most three, machines got through. Those responsible for the defence of London were doing their best, night and day, to defeat the Huns who came over. "I do not think," he said, "it would be altogether politic to hang us whenever a bomb is dropped in London. It would be expensive from the point of view of *personnel*, and I am not quite sure that you would be much better off when you had hung us all."

We have heard and read speeches much more ornamental but far less convincing than this of Gen. Ashmore's. He went straight to the heart of the



(From a drawing by Roderic Hill, by arrangement with the "Sphere.")

A BRITISH BOMBING MACHINE CROSSING THE LINES ON THE WAY TO AN ENEMY POSITION.—Such a scene as the above may be witnessed any fine day on the Western Front. A bombing raid carried out by the R.F.C. is in progress. The aeroplanes are seen making their way over the lines under heavy anti-aircraft fire. In the lower right-hand corner a small hostile patrol has sighted the raid, and has decided that discretion is the better part of valour. A well-known sector of the lines is here shown, the woods appearing as weird dark shapes on the vast panorama. The long straight roads, so typical of France, stretch away over the wide expanse, dotted with little villages strewn, as it were, carelessly over it. As the eye follows them, fading gradually to an ill-defined horizon, it is baffled by the heavy pall of mist which hangs like a purple curtain abruptly from the sky, above which the summits of clouds appear as giant icebergs.

subject and told his hearers the precise truth about matters. There is not the slightest doubt, as "FLIGHT" has so often insisted, that no system of defence which has hitherto been evolved, either by ourselves or by the enemy, can guard altogether against aerial raids, and we believe that the fact is at last appreciated by the public, which now realises the truth of the statement that London is indeed a part of the battle-front and is content to take the risks which are inseparable from living inside the war zone. As a matter of fact, there is very little criticism to be heard anywhere of the efficiency of our defences. On the contrary, the public in general is perfectly satisfied that everyone concerned is doing his best, and that that best is a very good one.

If there is any quarrel it is with the Government. Rightly or wrongly, the Prime Minister has been credited with a somewhat profane promise, the exact meaning of which the public at large took to be that we were going to pay the enemy back in his own coin. Some weeks have elapsed since then, but the public are still waiting to hear of the promised "hell" being give to the Germans. It is true there have been sporadic raids into Germany, but so far as all the information available leads us to believe, these raids have been on quite inconsiderable places. What the people of these islands are waiting to hear of is the bombing of places like Cologne, Coblenz, Dusseldorff, Essen, or any one or two *important* cities which lie within range of our aircraft. There may be reasons why this has not been done, apart altogether from the tender feeling of the Bishops for the Hun, but they are not apparent to the layman, who is inclined to ask awkward questions. He does not mind being bombed from the air now that he knows it is all in the game of war, but he hates to feel that the game is a one-sided affair. The comment on this aspect of the matter becomes more and more bitter after every raid—which is scarcely surprising.

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Work for Small Firms.

There is one unsatisfactory aspect of the expansion of the aircraft industry under present circumstances to which it is as well that attention should be drawn. We refer to the number of small, ambitious firms, desirous of becoming Government contractors, who are financed by moneylenders. We agree entirely with the official view that the practice is one that ought not to be encouraged and that these firms would do well to go to the larger contractors, who would sub-let to them work most suited to their plants. By getting into the hands of moneylenders they are creating for themselves a double handicap. In the first place, the rapacious demands of the Jews have to be met—and the moneylending fraternity is not in the habit of advancing cash at commercial rates of interest. Secondly, the small firm is not in any case in a position to compete in the open market with the large contractors, and is thus compelled to accept contracts at prices which really do not show an adequate margin of profit, even if it were not handicapped by unsound methods of finance. If these small concerns were working on their own capital, they might manage to make ends meet, and even under favourable circumstances to expand, but when the moneylender comes into the calculation the ultimate result is almost a foregone conclusion.

There is plenty of work on aeroplanes to be had by small firms with plant capable of dealing with it. The larger contractors are only too willing to give it out, and the departments are as willing to encourage production by all and every legitimate means, so that it seems on the face of it to be the height of foolishness for these small concerns to invite a handicap which must almost inevitably prove their undoing in the end—and all for the sake of being able to do business direct because of the higher initial rate of profit expected. We say expected, because for the reasons given the profit actually gained will in most cases prove to be nothing but a paper one which will disappear altogether when interest on borrowed money, plus working costs, has been handed over.

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The Sale of Honours.

If anything were needed to inspire the man in the street with the belief that our public life is not all it should be—and that by a very long way—the missing factor must have been supplied by the disclosures made during the debate on the sale of honours, which took place in the House of Lords the other day. It has been a matter of more or less common knowledge for years past that honours were bought and sold, like butchers' meat, in market overt, but there have been many who hoped, and even believed, that the canker had not bitten deeply into the social system. That there were isolated cases in which honours have been conferred in return for financial services rendered to one political Party or another, or to highly placed individuals, everyone knew or suspected, but that chapter and verse could be given for a sufficiently large number of cases to convince the public that the majority of cases in which honours are given have something more behind them than the merits or public services of the recipient, must have come as somewhat of a shock to many.

It is indeed a sorry business and almost makes one envy the simplicity of the system of America and France, where there are no titles or honours to be bought and sold. Doubtless, we shall be told that in those countries political life is no cleaner than it is here and that offices of profit or honour are bought and sold in the way that peerages and knighthoods are trafficked in here. But at least they avoid the nauseous hypocrisy of our own methods. Besides, there are only a comparatively few offices and honours which can be bought and sold, while here the evil seems to penetrate everywhere. It is almost literally true that anybody—anything—can have honours conferred upon him if only he has money enough and is prepared to pay the price. It is a pure question of commerce—just like buying sheep. If you want a knighthood, the price is so much. For a baronetcy the price is nearly double—as it should be, since it gives the fortunate purchaser precedence over the less favoured orders, and he knows that the eldest sons of his descendants will bear a title which was once deemed honourable. A peerage, naturally, comes rather expensive and it is only the more plutocratic who can aspire to a coronet, and even some of these seem to jib at the price and content themselves with the humbler baronetcy. There is only one cheering aspect of the whole sordid matter, and that is that it might be worse than it is. We do not believe there has been any trafficking in the three higher degrees of nobility—no one has been able to buy any rank higher than that of viscount. That we have not achieved to dukedoms by purchase

is something to be duly thankful for—we should not like to know that we had fallen quite as low as Sicily, for example, where the market price for a dukedom was at one time, we believe, in the neighbourhood of twenty pounds. Apart, however, from the three noble orders and the higher orders of chivalry, there does not seem to be an honour or a distinction open to civilians which cannot be had for money. But now that the light of day has been thrown upon the unholy traffic it is permissible to hope that it will cease It is only a hope, because so long as there are political parties who depend more upon the machine than upon the merits of their politics they will want more money than they can raise by legitimate means, and the traffic in honours is too easy a way of raising the wind to be readily abandoned. If these things must be, why not create a few new orders and distinctions, each having its own fixed price, so that when a man is gazetted to any of them we may know he is merely a tuft-hunter and how much he has paid for the privilege of being able to call himself "Sir" or to sign his letters "Jampuff" without the trouble of prefixing his initials. It seems to us the idea has more than a passing merit. Everybody would be pleased. The Whips would get the money for their Parties; the gaping aspirants would get their titles; and the plain man in the street would no longer feel that an attempt was being made to delude him into the belief that Smith, the wealthy butterman, was really a benefactor of his country and not a robber of the widow and the orphan. We commend the scheme to the earnest attention of the Party organisations.

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The Moral of Salford.

"FLIGHT" being a journal with no politics, we do not intend to elaborate the political aspects of the recent election in Salford, which resulted in the return to Parliament of Mr. Ben Tillett, but there is a moral, apart altogether from politics, which the Government of the day will do well to ponder carefully. There were five outstanding items in the programme of the successful candidate, and these were, in their order:

Vigorous prosecution of the war.
Better pay for soldiers and sailors and their dependants.
More direct Government control of the necessaries of life.
Anti-profiteering in food.
Air-raid reprisals on a large scale.

This platform enabled Mr. Tillett to carry the constituency in the face of the opposition of a candidate backed by both the old Party organisations. True, it would appear that the Coalition might have made a happier choice in its candidate—it certainly seems to be a mistake to send an exponent of the "Oxford manner" to fight a working-class constituency. But after all is said and done, it stands out unequivocally that the electors of North Salford are not satisfied that the present Government is doing its best to carry out the programme which they have commissioned their new member to urge forward. And we may say that, unless our observation is completely at fault, what North Salford has had an opportunity of expressing at the polls is the opinion of the whole country. We want to get on with the war and to see all the side-issues which take up so great a proportion of the time of the House and the Government relegated to their proper place until the main business of beating the Hun is finished with. We want to see an end made of profiteering in the necessities of the life of the people, though we are not altogether of one mind as to whether this can be best achieved by more direct Government control. Experience has shown us that Government control almost inevitably leads to a rise in prices, so that it cannot be regarded as an unmixed blessing. Above all—and this what touches us most—the whole country is sick and tired of melodramatic promises while our civilian population is bombed from the air without any serious effort to hit back. As we have said in another place, the people are willing to accept all the risks of the game if only they are assured that the Germans are going through the same experiences, but there is a limit to their patience. It may be that Mr. Tillett will be able to enlighten the House in his own rough and ready fashion as to exactly what the working classes think of the tenderness with which the Hun and his cities seem to be regarded by our own powers that be. At least we trust so.

AIR RAID DAMAGE.

THE following are the detailed provisions of the new Government scheme of compensation for air raid damage:—

1. (*a*) Owners of property in the United Kingdom of an aggregate value not exceeding £500 will be compensated by the Government in respect of damage or destruction of any such property by the perils coverable by the Government aircraft and bombardment insurance policy, whether the property be insured under the Government insurance scheme or not so insured at the time of its damage or destruction.

(*b*) Owners of insurable property in the United Kingdom of an aggregate value exceeding £500 will be compensated up to that amount without payment of premium provided that all value in excess of £500 is insured under the Government insurance scheme.

2. If the property of an owner is not fully insured under the Government insurance scheme, any claim under this compensation scheme, as well as under any Government policy, will be subject to average in conformity with the terms and conditions of the Government aircraft insurance policy and the note thereto.

3. The total amount payable by the Government in respect of a claim will be discharged under any Government policy of insurance in force at the time of the damage up to the amount payable under such policy, and the balance, if any, will be discharged under this compensation scheme.

4. Owners of property may at their option insure the whole value of their property under the Government aircraft insurance scheme, but not by means of Post Office certificates, which will not be issued in future.

5. Compensation will be limited to the actual damage done, having regard to the condition and value of the property at the time of the damage, and will be devoted to making good the damage, subject to any conditions and exceptions which the Air-raid Compensation Committee may prescribe.

6. (*a*) In the case of uninsured property immediate notice must, when damage occurs, be given to the Air-raid Compensation Committee at Palmerston House, Old Broad Street, London, E.C. 2, or to their agents.

(*b*) In the case of damage to property insured under the Government aircraft insurance scheme immediate notice must be given to the office through which the insurance was effected.

7. No compensation will be paid:—

(*a*) In respect of any loss recoverable under any insurance.

(*b*) For money, securities, stamps, documents, manuscripts, or books of account.

(*c*) For consequential loss or theft.

(*d*) For any expenses incurred in preparing or supporting a claim on the Government.

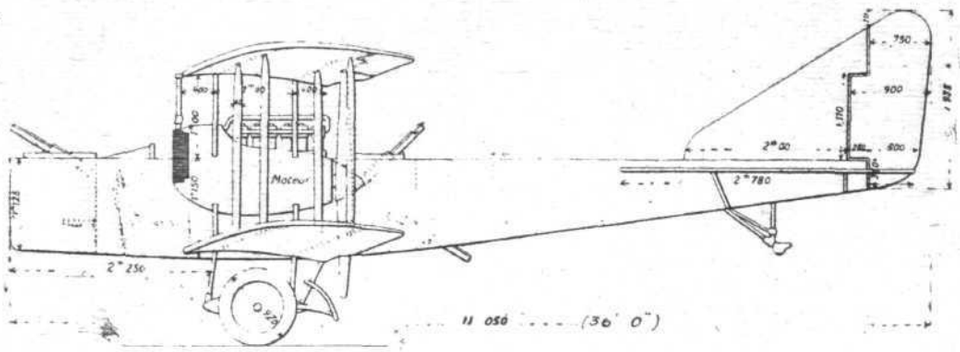
(*e*) For fees in connection with reinstatement of damaged property.

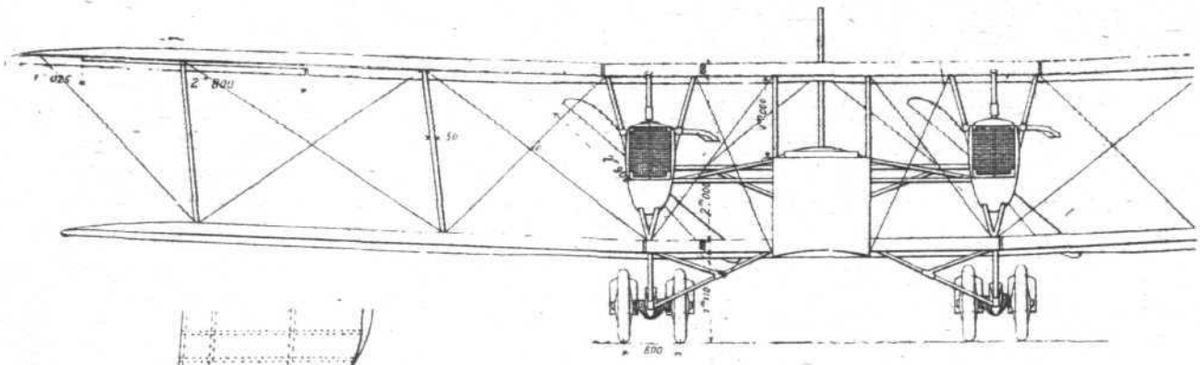
(*f*) In the event of a claim being fraudulent in any respect.

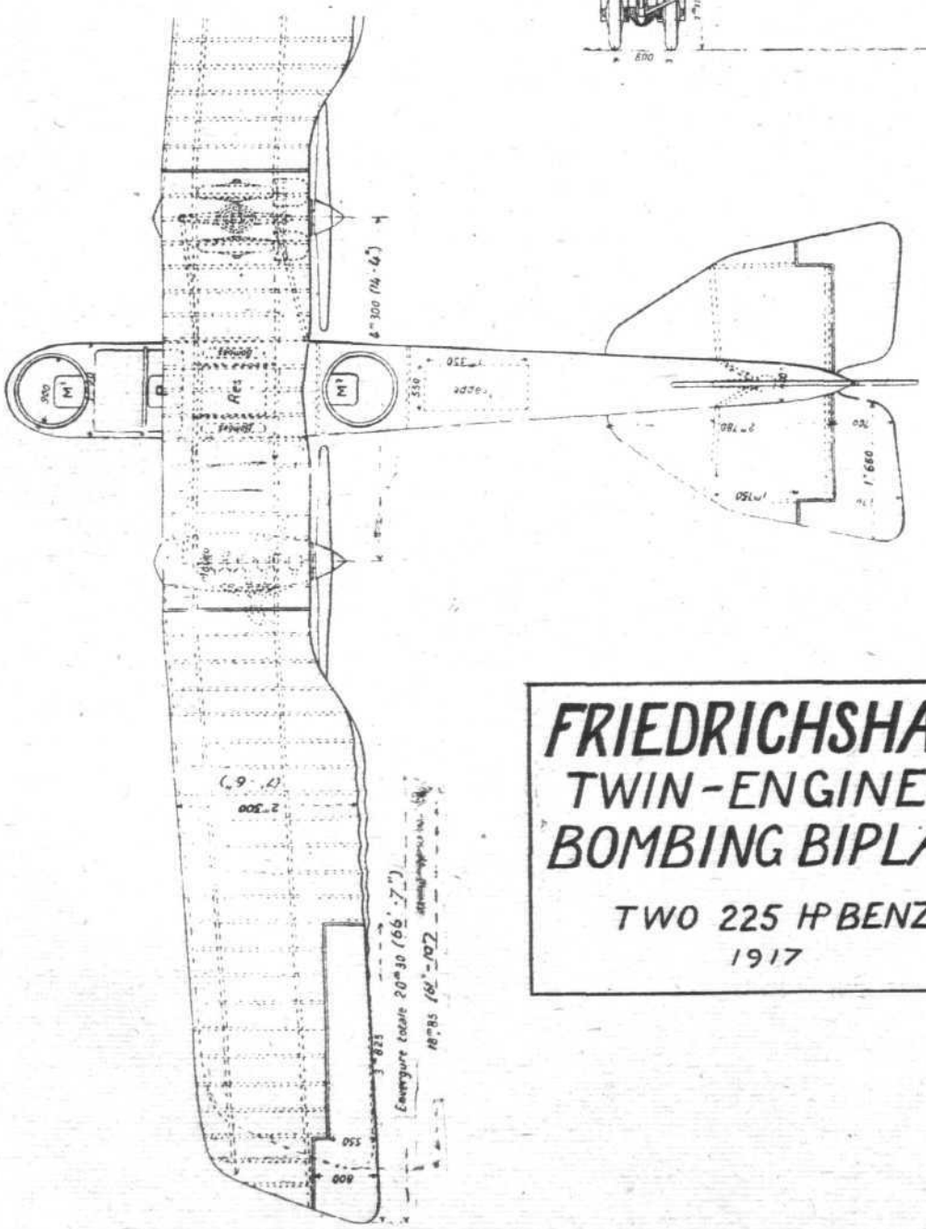
8. In no circumstance will a refund of premium be made in respect of any insurance that may have been effected with the Government.

9. This scheme will take effect as from September 1st, 1917.

THE GERMAN F.F. BOMBER.







FRIEDRICHSHAFEN
TWIN-ENGINED
BOMBING BIPLANE

TWO 225 HP BENZ

1917

FLIGHT

THE GERMAN F.F. BOMBER.

By M. JEAN LAGORGETTE (*l'Aerophile*).

THE Flugzeugbau Friedrichshafen have, for a considerable time past, specialised in the construction of seaplanes. For some time now they have also been making land machines, of which one type with two engines, now actually in service, is described in the following, from specimens captured recently on the French front near Verdun, and on the Macedonian front.

It is quite possible that these twin-engined machines have been used for raids on England, and on the vicinity of Paris, together with the Gothas, with which latter they have several points in common and of which, in certain respects, they are copies on a reduced scale. Their dimensions are as follows: Length about 11 metres; height, 3 m. 60 (3 m. 80 including air-screws) and 4 m. 10 to the top of the rudder). Span of upper wing, 20 m. 30; span of lower wing, 18 m. 85; the chord of the wings being about 1 m. 80 to 2 m. 30; the total wing surface is 70 sq. metres. The gap is 1 m. 95, close to the *fuselage*.

The wings are back-swept and set at a dihedral angle, except for the fixed central sections, which are straight on acccount of the mounting of the motors. The stagger is very small. The wing tips are raked and the *ailerons* have a wider chord at the tips than at the root. The trailing edges are cut away for a considerable distance in order to provide clearance for the propellers. Each motor is mounted on a framework of struts in the form of a V, and they are braced to the *fuselage* by struts running nearly horizontal. In addition to the motor struts, there are two pairs of interplane struts on each side, which slope outwards as shown in the front view. The overhang of the top plane is braced by diagonal wires running to the lower ends of the outer pair of interplane struts.

As distinct from the Gothas, the wing ribs are parallel to the centre line of the machine. Each of the *ailerons* has a forward projection near its tip, so as to partly balance it. The span of each *aileron* is 3 m. 80 and the chord is from 0 m. 50 to 0 m. 60. The area is about 2.3 square metres. The wings are painted green and reddish brown on the upper surface, and a clear blue on the under side.

The tail plane and elevators, the span of which is 3 m. 95 and the length 3 m. 65, resemble the irregular polygonal form of those of certain Albatros machines of 1914. The same applies to the very high rudder, in front of which is a fin of triangular shape, slightly rounded in front, and reminiscent of certain English biplanes, a feature which appears to become general on recent German machines. As on all German aeroplanes the elevators and rudder, like the *ailerons*, are balanced, and are constructed of steel tubing.

The *fuselage* is of the ordinary form, of rectangular section with the upper face horizontal. The maximum depth of the *fuselage* is 1 m 27, and the maximum width 1 m. 20. The cockpits in the *fuselage* are arranged in tandem, with sufficient space at the sides for changing places. In the nose is the gunner's cockpit, with a circular gun-ring. Behind him is the pilot's seat. Behind this again is the main petrol tank, which is 0 m. 90 in width, and on each side of this are the bomb racks, placed longitudinally. In the rear cockpit, which is occupied by a gunner, there is a circular gun-ring, similar to that employed in the front cockpit, and in addition there is in the floor a trap door, raised by means of a lever and cable, through which the gunner can fire in a rearward and downward direction by kneeling on the footboards. The front of the *fuselage* is covered with 3-ply, the rear with fabric. Behind the rear gunner, the *fuselage* is made detachable by means of four clips and bolts, so that the rear portion, with the tail planes, can be detached from the front part for ease in transport and storing.

The under-carriage differs considerably from that of other German biplanes. Under each motor there is a pair of wheels of 965 mm. diameter on a common axle and having a track of 0 m. 80. They are sprung by means of rubber shock-absorbers from a short skid, which is streamlined. The front and rear of these skids are connected to the lower plane by a strut sloping backwards to the base of each of the two V's which support the engines, and by a strut to the *fuselage*, placed at a very considerable slope.

The engines are six-cylinder Benz. No. 22799 gives 226 h.p. at 1,410 r.p.m., No. 25344 gives 221 h.p. at 1,400 r.p.m. Each of the engines is enclosed in a little boat-shaped *nacelle* terminating at the rear in a streamlined piece fitted over the propeller-boss. In the nose of the *nacelle* is mounted the radiator. The air-screws, which are marked "Imperial," have a diameter of 2 m. 90. The various tanks contain a total of about 550 litres of petrol. The oil tanks are placed under the radiators and extend a short distance to the rear.

In addition to the machine guns, the F.F. biplane appears to carry 12 explosive bombs and a few incendiary bombs. The number appears to vary. The total weight of the machine empty is 2,200 kilogs., the useful load 520 kilogs., and the weight of fuel 432 kilogs., giving a total weight of 3,152 kilogs., which works out at nearly 45 kilogs. per square metre, which is a very heavy loading, and 7 kilogs. per h.p. The machine carries fuel for four hours.

Manufacture and Sale of Ball Bearings Restricted.

THE Minister of Munitions in exercise of the powers conferred upon him by the Defence of the Realm Regulations, has made an order dated November 1st as follows:

1. No person shall on or after the date hereof until further notice manufacture any ball bearing or roller bearing (both of which are hereinafter included in the expression "ball bearing") or any part thereof except under and in accordance with the terms of a licence issued under the authority of the Minister of Munitions.

2. No person shall on or after the date hereof until further notice sell, supply or deliver any ball bearing or any part thereof whether situated in or outside the United Kingdom, or purchase or negociate for the purchase or take delivery of any ball bearing or any part thereof situated outside the United Kingdom except under and in accordance with the terms of a licence issued under the authority of the Minister of Munitions.

3. All persons engaged in the manufacture or sale of ball bearings shall make such returns with regard to their businesses as shall from time to time be required by or under the authority of the Minister of Munitions.

NOTE:—All applications in reference to this Order should be addressed to the Director of Ball Bearings, T.M.3., Ministry of Munitions, Whitehall Place, London, S.W. 1., and marked "Ball Bearings."

HONOURS.

Honours for R.N.A.S.

IT was announced in the *London Gazette* of November 2nd that the King has been pleased to approve of the award of the following honours, decorations, and medals to officers and men of the R.N.A.S. :—

Distinguished Service Order.

Flight Sub-Lieut. BERNARD ARTHUR SMART, R.N.A.S.

Distinguished Service Cross.

Flight Commander HAROLD AUSTEN BUSS, R.N.A.S.—For his services on the occasion of a bombing raid on Bruges Docks on the night of September 2nd-3rd, 1917, when numerous direct hits on the docks, submarine shelters, and railway sidings on the quay were obtained.

Act. Flight Commander STEARNE TIGHE EDWARDS, R.N.A.S.—In recognition of his services on the following occasions :—On September 3rd, 1917, with his flight he attacked a two-seater Aviatik. The enemy machine was observed to go down in a vertical nose-dive, and the enemy observer was seen to collapse in the cock-pit. On September 21st, 1917, he drove a two-seater enemy machine down out of control. On September 23rd, 1917, he attacked an Albatros scout, which crashed into the sea. On the same date he attacked three Albatros scouts. One got on the tail of another officer's machine at very close range, shooting him up very badly. Flight Commander Edwards attacked him from above, and the enemy machine turned on its back and went down in a vertical dive. He followed the enemy machine down to 8,000 ft., when its wings came off, and it fell to the ground.

Act. Flight Commander HOWARD JOHN THOMAS SAINT, R.N.A.S.—For conspicuous bravery in attacking superior hostile formations of enemy aircraft. On September 21st, 1917, he, with three other machines, attacked five hostile scouts. After getting to close quarters with one of them, he fired three bursts from his machine gun and drove it down completely out of control. On September 23rd, 1917, while leading a patrol of eight scouts, he attacked a hostile formation of ten machines. One of these he drove down, diving vertically, out of control. He has forced down other machines completely out of control, one of them in flames, and has also shown great courage in attacking enemy troops and aerodromes with machine-gun fire from very low altitudes.

Flight Lieut. HAROLD SPENCER KERBY, R.N.A.S.—For the great courage and initiative shown by him on many occasions, notably on August 12th, 1917, when he attacked hostile machines returning from a raid on England. One hostile machine was driven down by him to the water, where it was observed to turn over.

Flight Lieut. JOHN FLEMING JONES, R.N.A.S.—In recognition of his services on the night of August 15th-16th, 1917, when, under adverse weather conditions, he dropped bombs on railway sidings at Ostend, causing a fire which continued to burn as long as it was under observation.

Flight Lieut. ARTHUR FRANK BRANDON, R.N.A.S., (since killed).—For services on August 22nd, 1917, when he attacked single-handed an enemy formation returning from a raid on England, and brought down one of them in flames. As his aeroplane had been hit several times, he landed to change machines, and proceeded to attack again with a new one, making repeated attacks on individual machines, and pursuing the enemy formation over the North Sea to the Belgian coast, where he made a final attack.

Flight Lieut. RONALD ROSCOE THORNLEY, R.N.A.S.—For gallantry and skill in aerial combats, notably on the following occasions :—On June 16th, 1917, whilst on patrol, he attacked a two-seater Aviatik, which fell to the ground inside our lines. On August 15th, 1917, he attacked an Albatros scout and shot it down out of control. On August 19th, 1917, he attacked an Aviatik and drove it down out of control. On September 11th, 1917, he engaged one of three enemy machines, firing about 50 rounds when quite close, apparently wounding the observer at once, and shortly afterwards the enemy machine fell out of control.

Act. Flight Lieut. RICHARD PEARMAN MINIFIE, R.N.A.S.—In recognition of his services on the following occasions :—On April 22nd, 1917, he destroyed two enemy scouts. On August 8th, 1917, he brought down an Albatros scout in flames. On September 16th, 1917, he destroyed an Albatros scout. On September 19th, 1917, he crashed an Albatros scout. In addition to the above-mentioned combats, he has driven down numerous enemy machines out of control, and on July 3rd, 1917, he attacked parties of troops on the road from a height of 200 ft. On August 19th, 1917, he attacked two enemy aerodromes, firing 450 rounds at the hangars from a height of 400 ft. On September 20th, 1917, he did excellent work in detecting and scattering troops massing for counter-attacks, flying at an extremely low altitude.

Act. Flight Lieut. (now Flight Lieut.) ARTHUR ROY BROWN, R.N.A.S.—For the excellent work he has done on active service. On September 3rd, 1917, he attacked a two-seater Aviatik in company with his flight. The enemy machine was seen to dive down vertically, the enemy observer falling over on the side of the *fuselage* shot. On September 5th, 1917, in company with formation, he attacked an Albatros scout and two-seater, driving them away from our lines. One machine was observed to go down apparently out of control. On September 15th, 1917, whilst on patrol, he dived on two Aviatiks and three Albatros scouts, followed by his flight. He dived several times and picked out one enemy scout, firing about 200 rounds, when the enemy machine went down out of control, spinning on its back. On September 20th, 1917, whilst leading his flight, he dived on five Albatros scouts. Flight Lieut. Brown picked out one enemy machine and opened fire. One of his guns jambed, but he carried on with the other. The enemy machine went down out of control, and over on its back, and remained in that position for about 30 seconds, whilst Flight Lieut Brown continued firing until his other gun jambed. The enemy machine then disappeared in the clouds, still on its back. Another officer of the same patrol was later followed by four enemy machines, as he was separated from the formation. Both Flight Lieut. Brown's guns were jambed, but he dived on the enemy machines and drove them off, thus undoubtedly saving the pilot's life.

Act. Flight Lieut. (now Flight Lieut.) DESMOND FITZGERALD FITZGIBBON, R.N.A.S.—For exceptional courage and determination in leading offensive patrols agianst enemy formations, although often outnumbered by them. On September 14th, 1917, he and his patrol of seven machines attacked a hostile formation of eight enemy scouts. In the combat that ensued, three hostile machines were brought down completely out of control, one of these by Flight Lieut. Fitzgibbon, while the patrol suffered no casualties. On September 26th, 1917, he attacked with his patrol of eight machines 15 hostile scouts. He himself engaged four different machines, one after the other, finally driving one down completely out of control.

Flight Sub-Lieut. CHARLES BEVERLEY SPROATT, R.N.A.S.—Carried out a bombing attack on Bruges Docks on September 4th, 1917, obtaining direct hits. He was subjected to heavy and accurate anti-aircraft fire, and his machine was shot about and radiator pierced.

Flight Sub-Lieut. LEONARD WILLIAM ORMEROD, R.N.A.S., and Flight Sub-Lieut. JOHN SOUTHEY WRIGHT, R.N.A.S.—In recognition of their services on September 5th, 1917, when they carried out a bombing attack on Bruges Docks, obtaining direct hits.

Flight Sub-Lieut. WILLIAM ALLAN SCOTT, R.N.A.S.—In recognition of his services on the night of August 15th-16th, 1917, when, in spite of difficult conditions, he dropped bombs on Thourout railway station and sidings. He circled the objective for an hour at a height of 3,000 ft, dropping his bombs singly, and achieved good results.

Observer Sub-Lieut. PAUL BREWSHER, R.N.A.S.—In recognition of his services on the night of August 15th-16th, 1917, when, with Flight Lieut, Jones, in spite of adverse weather conditions, he dropped bombs on railway sidings at Ostend, causing a fire which continued to burn as long as it was under observation.

Distinguished Service Medal.

Leading Mech. R. W. BAGER, O.N. F2176; Act. Air-Mech. 1st Gr., H. G. LOVELOCK, O.N. J26402 (Po.); P.O. Mech. B. Hinkler, O.N. F311 (Ch.).

The following officers and man have been mentioned in despatches :—

Squadron Commander C. H. BUTLER, D.S.O., D.S.C., R.N.A.S.; Flight Sub-Lieut. (now Flight Lieut.) C. H. FitzHerbert, R.N.A.S.; Flight Sub-Lieut. M. A. Harker, R.N.A.S.; Flight Sub-Lieut. E. B. Drake, R.N.A.S.; P.O. (E) A. A. B. Cox, O.N. F17751.

THE King has been pleased to approve of the award of the following honours to officer and man for services in action with enemy submarines :—

Distinguished Service Cross.

Flight Lieut. T. H. NEWTON, R.N.A.S.

Distinguished Service Medal.

Act. Air-Mech., 1st Gr., W. N. BLACKLOCK, O.N. F4157.

Mentioned in Despatches.

Flight Sub-Lieut. T. C. TRUMBLE, R.N.A.S.

Corrections.

In *Gazette* of August 11th, for A.C., 2nd Gr., J. W. GEORGE, O.N. F20006, read Air-Mech., 1st Gr., F. J. GEORGE, O.N. F1947.

In *Gazette* of August 29th, 1917, for Flight Lieut. R. H. COLLETT, D.S.C., R.N.A.S., read Flight Lieut. R. H. COLLET, D.S.C., R.N.A.S.

In *Gazette* of October 1st, 1917, for Flight Lieut. C. S. COLSTON, R.N., read Flight Lieut. C. S. COLTSON, R.N.; for C.P.O. Mech., 2nd Gr., A. J. CORBETT, O.N. F54 (now Warrant Officer, 2nd Gr.), read C.P.O. Mech. 2nd Gr., A. J. CORBITT, O.N F54 (now Warrant Officer, 2nd Gr.).

Foreign Honours for R.N.A.S.

IT was announced in the *London Gazette* of November 2nd that the following decorations have been conferred by the Allied Powers on officers of the British naval forces for distinguished services rendered during the war :—

CONFERRED BY THE EMPEROR OF JAPAN.

Order of the Rising Sun, 2nd Class.

Rear-Admiral C. L. VAUGHAN-LEE, C.B.

3rd Class.

Capt. M. F. SUETER, C.B., R.N. (Commodore 1st Class).

CONFERRED BY THE PRESIDENT OF THE FRENCH REPUBLIC.

Legion of Honour.

Chevalier.

Wing Commander C. L. COURTNEY, R.N.

Squadron Commander B. L. HUSKISSON, D.S.O., R.N.A.S.

Croix de Guerre.

Flight Lieut (Act. Flight Commander) R. GRAHAM, D.S.C., R.N.A.S.

Flight Lieut. BASIL E. P. GREGG, R.N.A.S.

CONFERRED BY THE RUSSIAN GOVERNMENT.

Order of St. Vladimir, 4th Class.

Lieut. Commander (Act. Commander) R. GREGORY, R.N.

The King has given unrestricted permission to the officer named to wear the decorations in question.

"X" AIRCRAFT RAIDS.

IN view of the decision of the Government not to allow details of places visited by enemy aircraft to be published, we are, as before, giving to each one an index number. Eventually, when details are available, we shall give the respective information under these index numbers, which will facilitate easy reference to each particular raid.

"X" 82 Raid (October 31st).

The following *communiqués* have been issued by the Field-Marshal Commanding-in-Chief, Home Forces :—

"*October 31st.*

"At 4.30 a.m. a hostile aeroplane crossed the Kentish coast. The enemy machine did not penetrate far inland, and on being engaged by our anti-aircraft guns immediately dropped some of its bombs in fields, and made off to sea, dropping the rest of its bombs in the water. No casualties or damage were caused."

"X" 83 Raid (October 31st–November 1st).

"*November 1st, 12.15 a.m.*

"Hostile aircraft crossed the South-East Coast in relays between 10.45 and 11.30, and proceeded towards London. The raid is still in progress."

"*November 1st, 12.15 p.m.*

"Determined and repeated attacks were made upon London last night by groups of hostile aircraft. The first group of raiders crossed the Kentish coast about 10.45 p.m., and proceeded over Kent towards London. They did not penetrate far inland, however, but turned eastward, and dropped bombs at various places in and near the coast. Meanwhile, two more groups of raiders were steering towards London along the south bank of the Thames. The sky was half to three-quarters covered with low thin clouds, which rendered observation of the enemy machines extremely difficult. None the less, their altitude was correctly calculated, and they were broken up by the barrage fire on the south-eastern outskirts of the Metropolitan area about 11.50 p.m., where some bombs were dropped. A fourth group of machines, which came along the Thames estuary, was turned back about half way to London. Meanwhile, a fifth group crossed the Essex coast about 12.15 p.m., and steered towards London by way of the north bank of the Thames. Some of these raiders were turned back by the outer defences, but one or more penetrated into South-East London, where bombs were dropped. A sixth group followed along the same course about a quarter of an hour later. Some of these machines penetrated into the South-East outskirts of London, where bombs were dropped. Meanwhile, one or more enemy machines dropped bombs in the South-Western outskirts of London. A seventh group, which approached along the south bank of the Thames, was dispersed by gunfire before reaching the outer London defences. In addition, individual raiders attacked the Kentish coast between midnight and 1.30 a.m.

"Reports indicate that each group consisted of three or four machines, the total number of raiders engaged being about 30. Of this total only about three machines succeeded in actually penetrating into the heart of London. The raiders were harassed by gunfire during the whole of their flight, and were also attacked by our own aircraft. The facility with which they were able to escape observation by taking advantage of cloud prevented any decisive engagement. Full reports have not yet been received, but those already furnished point to comparatively light casualties and damage, considering the number of machines and the determined nature of the attack."

"3.15 *p.m.*

"Latest police reports state that the total casualties caused in last night's air raid in all districts were : Killed, eight ; injured, 21. Material damage was very slight, and no injury was done to any naval, military, or munitions establishment. A large number of our own machines went up, and all returned safely."

German Version.

"*Berlin, November 2nd.*

"Our airmen successfully attacked London and English coastal towns on the night of October 31st- November 1st. One of our bombing squadrons heavily and effectively bombed military objects in the heart of London and in the harbour places of Gravesend, Chatham, Ramsgate and Dover. Large fires broke out in London, Chatham and Ramsgate. Other bombing squadrons attacked the fortress and shipyards of Dunkirk, and military objects behind the Flanders front, causing numerous explosions and fires. All our aeroplanes returned."

The Army Council.

IT was announced in the *London Gazette* on November 2nd that the King has been pleased, by Letters Patent under the Great Seal of the United Kingdom of Great Britain and Ireland, bearing date October 18th, to appoint :—

The Right Hon. Edward George Villiers, Earl of Derby, K.G., G.C.V.O., C.B., President ; General Sir William Robert Robertson, G.C.B., K.C.V.O., D.S.O. ; Lieut.-General Sir John Steven Cowans, K.C.B., M.V.O. ; Lieut.-General Sir Cecil Frederick Nevil Macready, K.C.B., K.C.M.G. ; Major-General Sir William Thomas Furse, K.C.B., D.S.O. ; Major-General Sir Robert Dundas Whigham, K.C.B., D.S.O. ; Major and Brevet Lieut.-Colonel (temporary Major-General) ; John Maitland Salmond, C.M.G., D.S.O. ; James Ian Macpherson, Esquire ; the Right Hon. Henry William Forster ; Sir William Guy Granet ; Andrew Weir, Esquire ; to be His Majesty's Army Council. It will be noted that Major General Salmond, the new Director-General of Military Aeronautics, takes the place of Lieut.-General Sir David Henderson, K.C.B., D.S.O.

"Mentioned in Despatches."

IN the despatch from General Sir Charles Monro, Commander-in-Chief, India, detailing operations in India from March 10th, 1916, to March 31st, 1917, the following officer is among those mentioned for gallantry or good service on the North-West frontier : Major C. R. S. BRADLEY, R.F.C. In his report on the N.W. frontier, Maj.-Gen. Campbell specially commended the action of the aeroplanes of the squadron, R.F.C., in co-operation with the artillery.

STRUT CHARTS.

By H. M. BUCKWALD, M.E., of the Engineering Department, Standard Aero Corp.

CALCULATIONS of struts form an important part of aeroplane design. There are the interplane struts, the interior wing stays for drift, the body *longerons* and the body struts. There are also the struts of the landing gear.

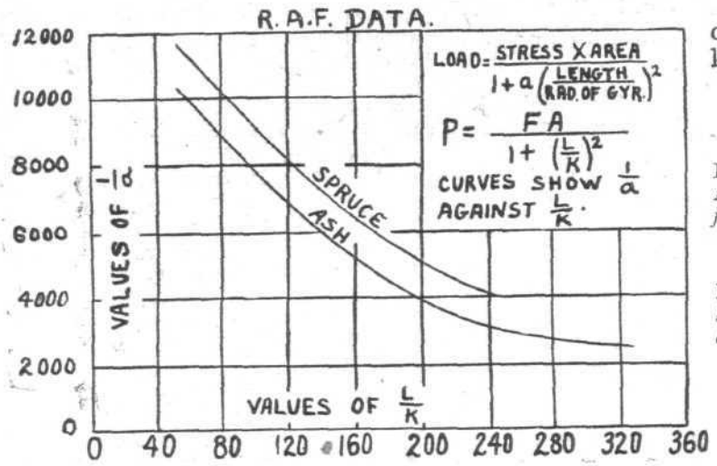


Fig. 1.

Usually the lengths of these members are known, and also the load to which they will be subjected, the latter being obtained from the stress diagrams. The problem then is to find the cross-sectional area that will enable the strut to fulfil the conditions.

Struts are regarded as columns, and either Rankine's or a modification of Euler's formulæ is used. Rankine's formula for pin-connected struts is :—

$$\frac{P}{A} = \frac{f}{1 + a\left(\frac{L}{k}\right)^2}, \text{ where}$$

P = Crippling load of struts in pounds.
A = Area of section in sq. in.
f = Fibre stress. 5.600 lbs./sq. in. for spruce. (R.F.A. Data.)
6.250 lbs./sq. in. for ash.
L = Strut length in inches.
k = Least radius of gyration of section in inches.
a = A constant which depends on the value of L/k. See Fig. 1.

The results of Hunsaker's experiments on spruce struts are given in the following formulæ:—

For pin-connected struts.

$$\frac{P}{A} = 6500 - 46.5\,\frac{L}{k} \text{ when } L/k \text{ is less than } 70.$$

$$\frac{P}{A} = \frac{8.72E}{\left(\frac{L}{k}\right)^2} \text{ when } L/k \text{ is greater than } 70.$$

E is the modulus of elasticity of spruce 1.825,000 lbs./sq. in. The other symbols are as before.

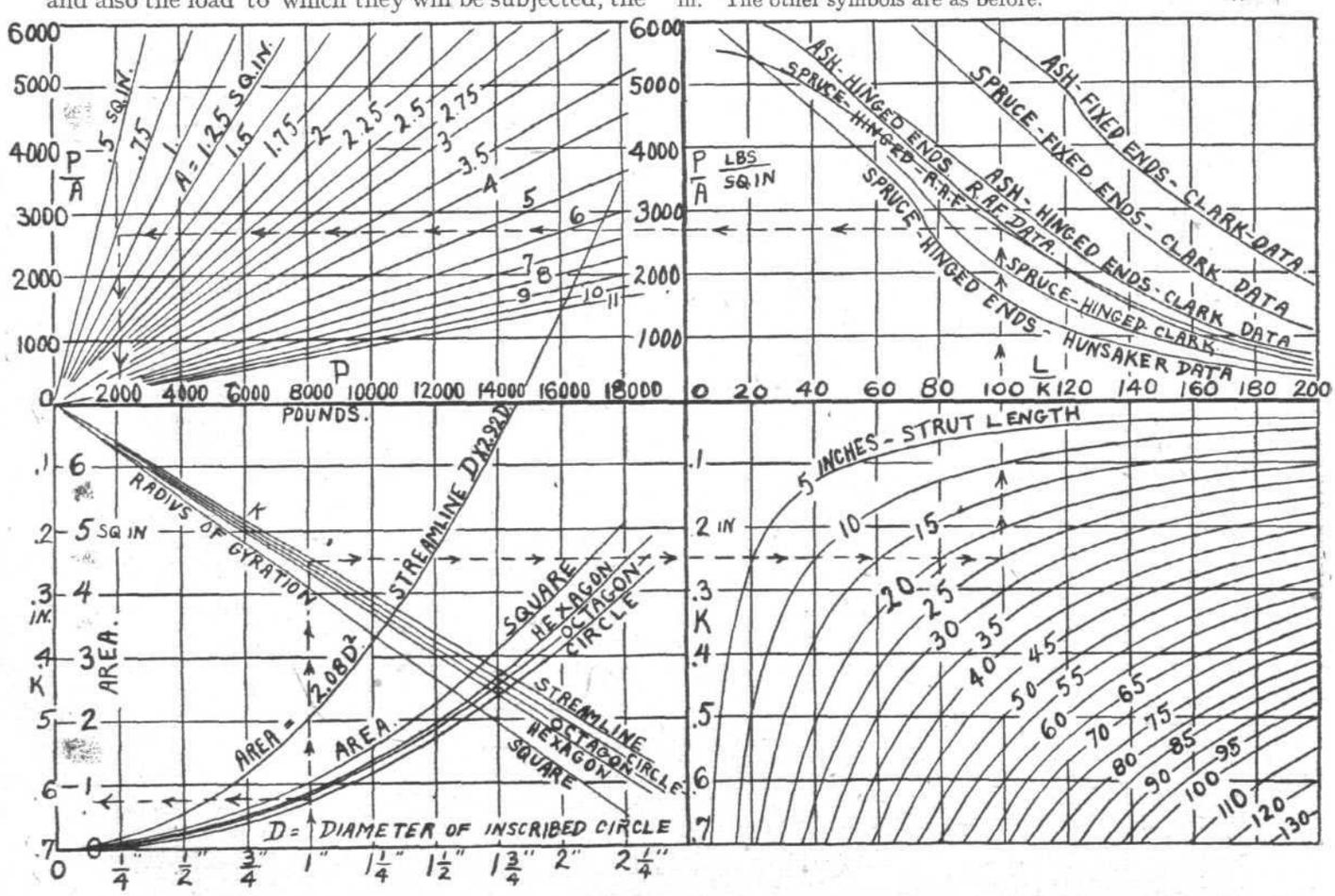


Fig. 2. UNIVERSAL STRUT CHART.—For use in finding the crippling load of any size and length of spruce and ash struts. Example: Find the crippling load of a circular spruce strut 1 inch in diameter and 25 inches long; pin-connected at the ends. Use the R.A.F. data. The dotted line shows the method of procedure. Start at the lower left hand corner at D = 1". Run vertically until the area curve for circles is reached. Looking at the area scale to the left, we note that the area of a 1-inch circle is .785 sq. in. We proceed vertically along our D line until we reach the radius of gyration line for circles. Then project horizontally to the right until we reach our 25-inch line. Now run vertically upward to the spruce-hinged R.A.F. line. Then project horizontally to the left until the proper area line is reached. In our case it is .785 sq. in. Then drop vertically, downward and we see that the crippling load of our strut is 2,100 lbs.

FLIGHT
& AIRCRAFT ENGINEER

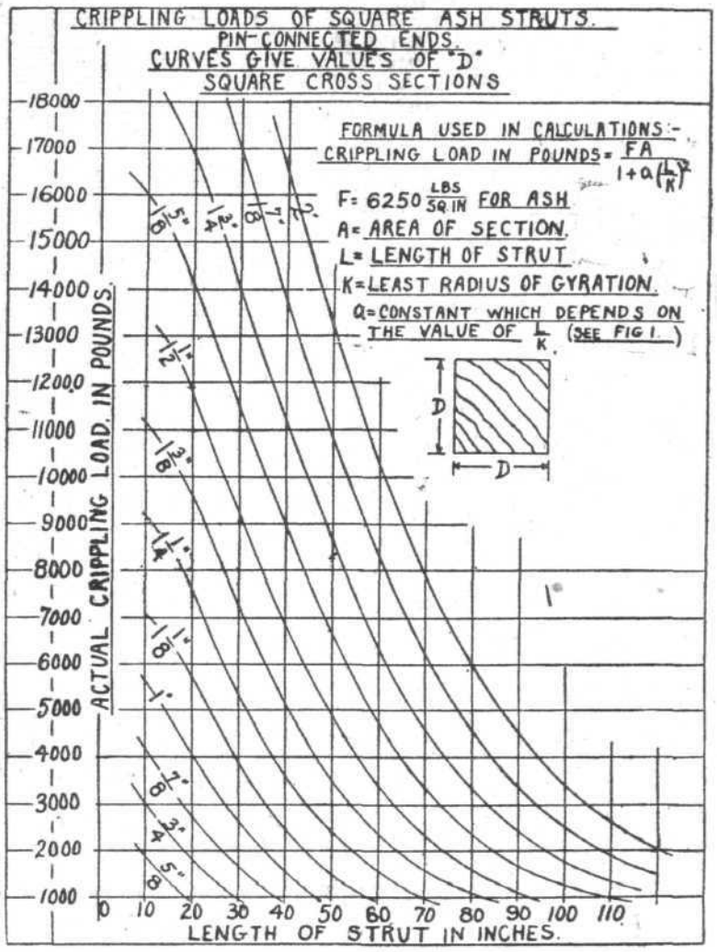


Fig. 3.

The common procedure in figuring a strut of known length to resist a certain load, is to assume an area, calculate its radius of gyration, and then to use one of

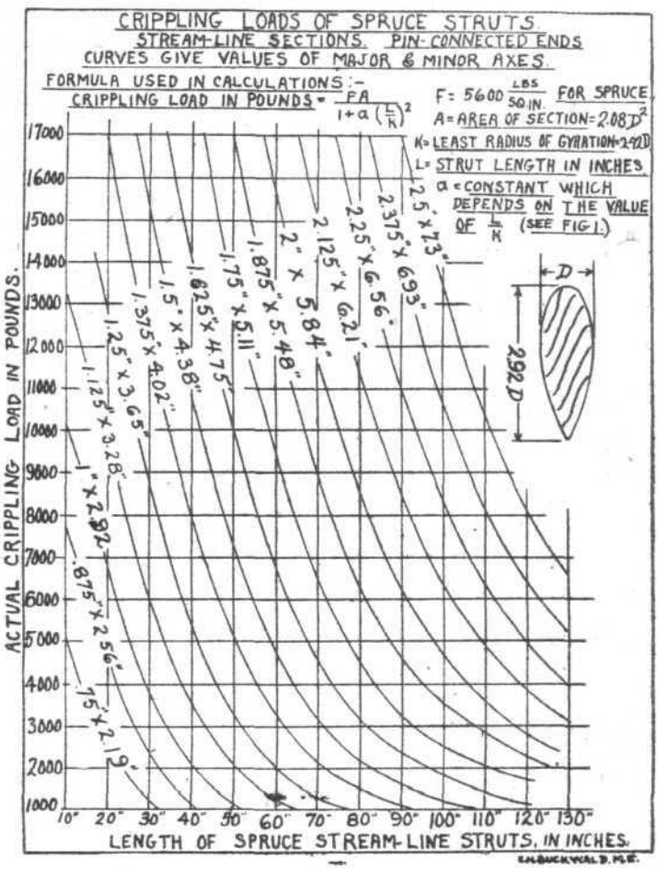


Fig. 5.

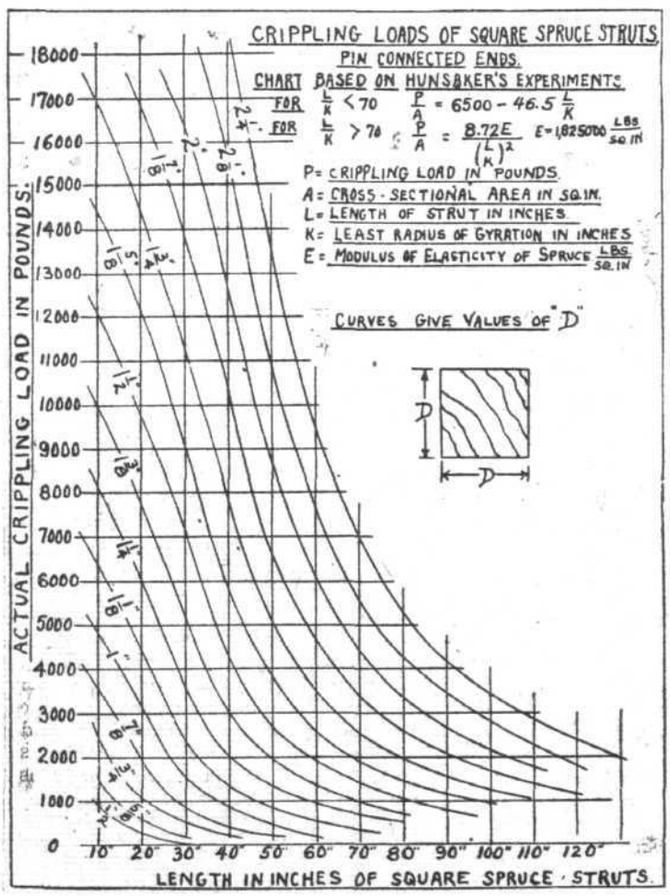


Fig. 4.

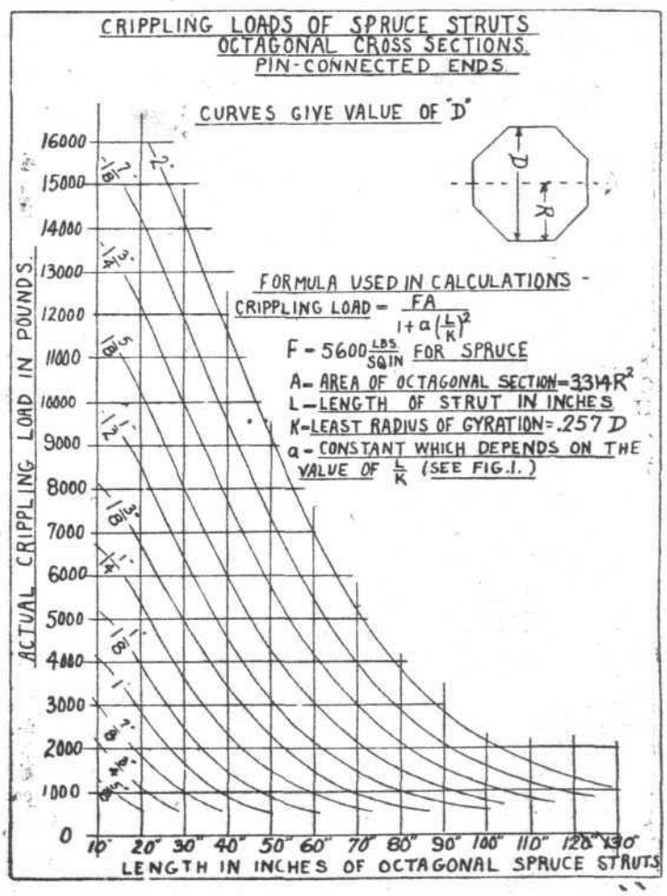


Fig. 6.

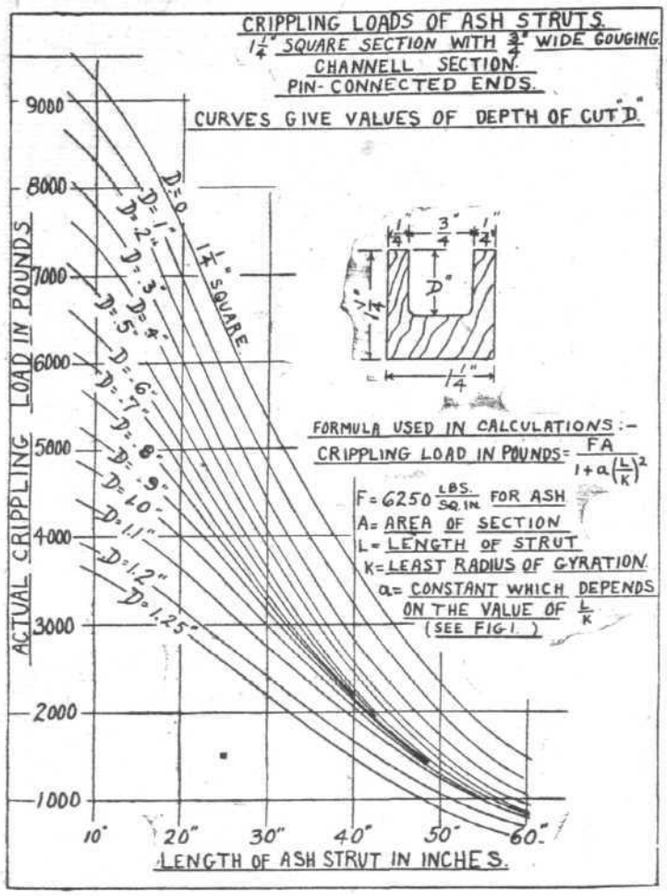


Fig. 7.

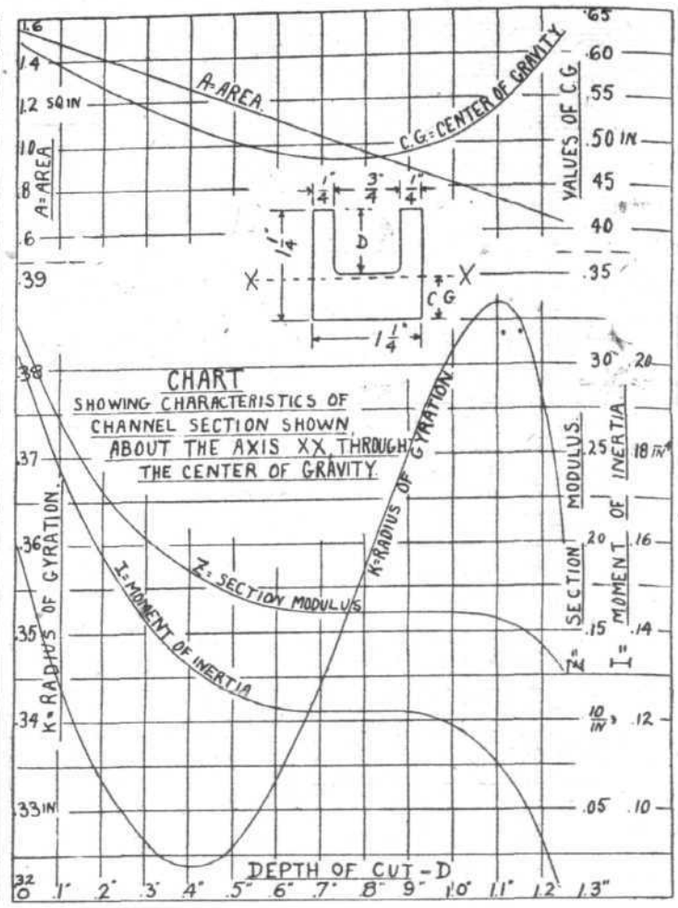


Fig. 8.

the above formulæ and see what crippling load our chosen section will have. This usually falls above or below our required load, and so several values of area must be tried. This involves much computation, and, in order to avoid this, the accompanying charts have been constructed.

Fig. 2 represents a universal strut chart which, as the name implies, may be used to find the crippling loads of struts for any section, material, length, and also for various end connections such as round, fixed, or one end round and the other fixed, and for any experimental data.

The sections shown are stream-line, square, hexagonal, octagonal, and circular. In the upper right hand corner of the chart there are plotted experimental results of R.A.F., Clark, and Hunsaker.*

* R.A.F. data, "FLIGHT," October 18th, 1913, p. 1149. Clark's data, *Aerial Age*, August 7th, 1916, p. 635. Hunsaker's data, *Aerial Age*, August 16th, 1916; and *Aviation and Aeronautical Engineering*, June 15th, 1917, p. 442.

◈ ◈

From this universal chart special charts may be constructed which show at a glance the size of strut necessary for a given load and length.

These are represented in :—

Fig. 3 for square ash sections : R.A.F. data.
Fig. 4 for square spruce sections : Hunsaker data.
Fig. 5 for stream-line spruce sections : R.A.F. data.
Fig. 6 for octagonal spruce sections : R.A.F. data.
Fig. 7 for channel ash sections : R.A.F. data.

All of these Figs., 3 to 7 inclusive, are for pin-connected ends.

The channel section shown in Figs. 7 and 8 is very interesting. As is well known, the *longerons* of the body are often channeled out for lightness. The section shown is 1¼ in. sq. ash. The least radius of gyration occurs about the axis XX, Fig. 8, and if we take these values of area and radius of gyration and use them in the universal chart, we may construct Fig. 7, which shows the depth of channelling for any length and load.

◈ ◈

Air Fighting in October.

IN its excellent summary of air fighting, on the Western front, for the month of October, the *Times* says :—

"It is impossible to give the precise figure of air losses on the Western front during October owing to the fact that the fighting on the 13th was so close that, in the words of the official British report, 'the number of hostile machines accounted for could not be determined by our pilots.' Several enemy aeroplanes falling out of control were, however, seen by other pilots who arrived too late to take part in the fight. The number actually reported by British, French, and German headquarters as having been shot or brought down, or driven down either completely out of control or in a damaged condition is 399, of which 281 are claimed by the Allies and 109 by the Germans. The enemy has not yet made a claim to the nine British machines which were reported missing in last night's *communiqué*. This total is 47 more than half that for September, when the figure was 704, and compares with 428 in August.

"Including those of the Royal Naval Air Service, the pilots of which carried out during the month almost daily raids on enemy bases in Belgium and patrols, the British losses amount to 109 machines. Against this our airmen and gunners on the battle front and our naval airmen brought down 113 enemy machines, and drove 73 down out of control. The record of the airmen acting under the Admiralty is a very fine one. They destroyed 11 and drove down 13 other machines, with a loss to themselves of only four machines. Sir Douglas Haig made the interesting announcement on October 22nd that the Naval Air Squadrons attached to the Army have been fighting throughout recent operations, and have accounted for a large share of the enemy machines brought down, and that the Australian Air Squadrons have also begun work on the battle front.

"The number of German machines accounted for by the French was 95, but it is difficult to say exactly how many of these were destroyed, because the Ministry of War, in reporting the fact that 25 fell to their pilots on October 24th, did not distinguish the number brought down and those driven down out of control."

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

FLYING SERVICES FUND.

MEETINGS of the Committee of the Flying Services Fund were held on Wednesday, September 19th, Monday, October 8th, and Monday, November 5th, 1917. Present: Major T. O'B. Hubbard, R.F.C. (Chairman), Mr. Chester Fox and Squadron-Commander C. E. Maude, R.N. In attendance Lieut.-Com. H. E. Perrin, R.N.V.R.

An allowance of £1 10s. per week for six months was granted to the widow of an aircraftsman in the Royal Naval Air Service.

An allowance of 15s. per week for six months was granted to the widow of a 2nd Class Air-Mechanic in the Royal Flying Corps.

A grant of £10 was made to a 1st Class Air-Mechanic in the Royal Flying Corps who had been injured on active service.

A grant of £5 was made to the widow of a Sergeant in the Royal Flying Corps pending the consideration of her case for a weekly allowance.

A grant of £5 was made to a Petty Officer in the Royal Naval Air Service who has been incapacitated.

THE FLYING SERVICES FUND, administered by THE ROYAL AERO CLUB.

THE Flying Services Fund has been instituted by the Royal Aero Club for the benefit of officers and men of the Royal Naval Air Service and the Royal Flying Corps who are incapacitated on active service, and for the widows and dependants of those who are killed.

The fund is intended for the benefit of all ranks, but especially for petty officers, non-commissioned officers and men.

Forms of application for assistance can be obtained from the Royal Aero Club, 3, Clifford Street, New Bond Street, London, W. 1.

Subscriptions.	£	s.	d.
Total subscriptions received to Nov. 6th, 1917..	12,470	17	9

H. E. PERRIN, Secretary.

3, Clifford Street, New Bond Street, W. 1.

ANSWERS TO CORRESPONDENTS.

[As a number of letters reach us signed with initials only, some of which do not give a complete address, we would point out that such communications cannot be dealt with in our columns. Full name and address, which will not be published, must always be given.—ED.]

A. H. (Bickley).—We have not hitherto heard of the phenomena you mention, *i.e.*, that a bomb launched from a "pusher" should have a tendency to fall at an angle towards the nose of the machine, and that one launched from a tractor should tend to fall in a rearward direction. We can scarcely believe that this could be the case. Obviously the bomb, at the moment of release, is travelling at a horizontal velocity equal to that of the machine, and this would, of course, apply equally to both types. The only other force to which the bomb is subject, apart from the action of gravity, is the wind. In the case of a tractor the velocity of the air relatively to parts in the slip stream will be somewhat higher than that of parts outside the slip stream. Possibly it is this fact which has given rise to the idea that a bomb launched from a tractor should have a tendency to travel in a backward direction. This is, of course, assuming that the bomb is carried on some part of the body or wings which lies inside the slip stream. The slight difference in velocity would, however, be negligible as far as its effect on the path of a bomb is concerned. With regard to the "pusher" there would not appear to be any reason to suppose that the dropping bomb would travel along any other curve than that followed by all bodies dropping from a height and having an initial horizontal velocity—i.e., it would follow a parabolic curve.

F. H. O. (Norwich).—A tail plane, in order to be non-lifting at 0° incidence, must be of symmetrical section, *i.e.*, either flat or double cambered. On modern high-speed machines the flat tail plane is not extensively employed, chiefly because at small angles of incidence the resistance is comparatively great, and also owing to the fact that such a thin structure—if the tail plane be of any considerable area—is not very strong and requires a fair amount of external bracing, which further increases the resistance. Sometimes designers employ a section having a flat bottom surface and a cambered top surface. This is usually done in order to neutralise the effect of a down draught on the tail plane caused by the deflection of air from the top main plane. Since, however, you specify that the section must be non-lifting at 0° incidence such a section cannot be employed, as it would have to fly at a small negative angle in order to give no lift. There then remains the double cambered surface which is symmetrical about its chord line. In some recent German aeroplanes—as the Albatros D II—such a plane is employed, which is of very considerable thickness in proportion to its chord. Some tests carried out for the Curtiss Aeroplane Co. at the Massachusetts Institute of Technology on a tail plane of aspect ratio 4, and of a maximum depth or thickness of nearly .09 of the chord, indicate that such a tail plane has quite a low resistance, a fairly good lift, and a very small travel of the centre of pressure. The following table giving lift co-efficients and drag co-efficients (in lbs. per sq. ft. per ft./sec.) should provide you with the information required :—

Angle of incidence.	Drag co-efficient.	Lift co-efficient.	Angle of incidence.	Drag co-efficient.	Lift co-efficient.	Angle of incidence.	Drag co-efficient.	Lift co-efficient.
0	.000017	0	6	.00004	.00045	12	.00017	.00084
2	.000018	.00017	8	.000064	.00059	14	.00023	.00088
4	.000025	.00032	10	.00011	.00072	16	.00028	.00089

The section tested was of the following curvature :—

Dist. from leading edge, per cent. of chord..	0	20	40	60	80	100
Thickness per cent. of chord	0	7.92	8.75	7.00	3.72	0.42

N. H. B. (Rothley).—Without wind tunnel tests on a model of the body it is impossible to say exactly what would be its resistance at 60 m.p.h. A fair estimate, however, would appear to be about 15 lbs. It should be remembered that this is the resistance outside the slip stream at 60 m.p.h. In practice, as the body is designed for a tractor, this resistance will be somewhat higher. How much higher will depend on the slip at which the propeller is running. For purposes of approximation it may be assumed that the resistance of the body will be 1½ times as great in the slip stream. For the body in question, therefore, the resistance, allowing for the effect of the slip stream, may be estimated to be roughly 22 lbs. We have no figures of the weights—empty and loaded—of the Gotha and A.E.G. twin-engine machines. From laboratory tests it appears that there is no advantage, aerodynamically, in a backward stagger; on the contrary there appears to be a slight disadvantage. When, in spite of this, it is sometimes employed on aeroplanes the reasons are practical ones, such as giving the pilot a better view in a forward and upward direction.

THE ROLL OF HONOUR.

REPORTED by the Admiralty:—

Accidentally Killed.

Flight Lieut. A. F. Brandon, R.N.

Dangerously Wounded.

Flight Sub-Lieut. W. M. Davidson, R.N.

Wounded.

Flight Sub-Lieut. W. H. Clapperton, R.N.
Flight Sub-Lieut. C. H. Pownall, R.N.

Accidentally Injured.

Flight Sub-Lieut. A. E. Webber, R.N.

Missing.

Flight Sub-Lieut. H. G. B. Linnell, R.N.
Flight Sub-Lieut. A. Macdonald, R.N.
Prob. Flight Officer G. H. Morang, R.N.
Flight Sub-Lieut. J. S. Smith, R.N.

Previously Missing, now reported Prisoner.

Flight Sub-Lieut. A. T. Gray, R.N.

Reported by the War Office:—

Killed.

Lieut. A. O. Balaam, Suff., attd. R.F.C.
Capt. S. H. Clarke, M.C., Wilts., attd. R.F.C.
2nd Lieut. W. H. Falkner, R.F.C.
2nd Lieut. D. K. MacLeod, R.F.A.
Lieut. D. S. P. Prince-Smith, R. Dub. F., attd. R.F.C.
2nd Lieut. F. J. Sharland, R.F.C.
8699 1st Air-Mech. F. Rigby, R.F.C, attd. R.G.A.
2nd Lieut. F. Skelton, R.F.C.
44580 2nd Air-Mech. C. J. Green, R.F.C.
8699 1st Air-Mech. F. Rigby, R.F.C., attd. R.G.A.

Previously reported Accidentally Killed, now reported Killed.

88146 2nd Air-Mech. J. H. Muscutt, R.F.C.

Previously Missing, now reported Killed.

Lieut. A. R. Adam, Sea. High., att. R.F.C.
2nd Lieut. R. W. L. Anderson, R.F.C.
2nd Lieut. F. A. Bell, R.F.C.
2nd Lieut. J. K. Campbell, R.F.C.
Lieut. F. S. Ferriman, Oxf. and Bucks., attd. R.F.C.
Lieut. M. Lowe, R.F.C.
2nd Lieut. J. R. S. Proud, R.F.C.
2nd Lieut. D. N. Robertson, R.F.C.
2nd Lieut. T. West, R.E., attd. R.F.C.
Lieut. C. S. Workman, M.C., Sco. Rif., attd. R.F.C.
61925 Sergt. W. A. Barnes, R.F.C.
19789 1st Air-Mech. W. Bond, R.F.C.
1897 1st Air-Mech. P. Bonner, R.F.C.
46133 2nd Air-Mech. A. W. Ekins, R.F.C.
40181 2nd Air-Mech. A. Trusson. R.F.C.

Previously Wounded, now reported Killed.

Capt. W. V. T. Rooper, Yeo., attd. R.F.C.

Previously Missing, now reported by German Government Killed or Died of Wounds.

61783 2nd Air-Mech. E. King, R.F.C.

Accidentally Killed.

Lieut. C. H. MacNeil, Manit., attd. R.F.C.

Died of Wounds.

2nd Lieut. J. N. Cunningham, R.F.C.
2nd Lieut. C. P. Dixon, R.F.C.
2nd Lieut. P. C. N. Hunter, Staffs, attd. R.F.C.
Lieut. G. B. Shone, M.C., S. Staffs., attd. R.F.C.
53662 2nd Air-Mech. C. Browne, R.F.C.
92566 2nd Air-Mech. E. T. Fowler, R.F.C.
29292 1st Air-Mech. A. W. Hall, R.F.C.
6838 1st Air-Mech. T. B. Mullins, R.F.C.
29174 2nd Air-Mech. B. W. Payne, R.F.C.
27094 1st Air-Mech. W. H. Tracey, R.F.C.
30052 1st Air-Mech. F. Tredale, R.F.C.
11706 1st Air-Mech. C. W. Wingfield, R.F.C.

Previously Missing, now reported Died as Prisoner in German hands.

77449 Sergt. B. Aldred, R.F.C.

Died.

2nd Lieut. H. J. McCracken, R.F.C.
2nd Lieut. J. E. Terry, R.F.C.
Lieut. R. J. S. White, Manit., attd. R.F.C.
1397 W. H. Hereford, Aus. F.C.

Wounded.

2nd Lieut. A. F. Castle, R.F.C.
2nd Lieut. T. A. Ford, R.F.C.
2nd Lieut. A. H. Hepworth, R.F.C.
2nd Lieut. H. Hirst, R.F.C.
2nd Lieut. D. d'H. Humphreys, Lond., attd. R.F.C.
2nd Lieut. H. M. Hutton, R.F.C.
2nd Lieut. H. F. Jenkins, R.F.C.
2nd Lieut. J. T. Johnson, R.F.C.
2nd Lieut. I. H. Lawrence, R.F.C.
2nd Lieut. P. A, MacDougall, R.F.C.
Lieut. T. J. McInnis, Sask., attd. R.F.C.
Major H. M. Meyler, M.C., Bord., attd. R.F.C.
2nd Lieut. F. H. Parker, R.F.C.
2nd Lieut. T. L. Quinn, R.F.C.
2nd Lieut. D. Shanks, R.F.C.
2nd Lieut. R. B. Slade, R.F.C.
Lieut. A. Sleep, R.F.C.
2nd Lieut. W. S. Spark, R.F.C.
2nd Lieut. E. T. Thorpe, R. Warw., attd. R.F.C.
2nd Lieut. H. L. Walter, Dn. Gds., attd. R.F.C.
Lieut. E. C. Weegar, Can. Rly. Tps., attd. R.F.C.
2nd Lieut. J. S. Wesson, Worc., attd. R.F.C.
2nd Lieut. A. S. White, R.F.C.
2nd Lieut. C. G. Wood, R.F.C.

The following unless otherwise stated are mechanics in the R.F.C., the figure in brackets indicating the grade :—

66941 (2nd) H. Andrews; **27332** (2nd) A. T. J. Court; 31725 (2nd) B. L. Hall; 56087 (2nd) W. H. Johnson; 57248 (2nd) C. Moy; 58569 (2nd) P. H. Sandwell; 44982 (2nd) W. H. Hadgraft, R.F.C., attd. R.F.A.; 49926 (2nd) L. A. Chapman.

Previously Prisoner, now reported Wounded and Prisoner in German hands.

Lieut. O. J. Partington, R.F.C.

Missing.

Lieut. J. C. G. Agnew, Aust. F.C.
2nd Lieut. H. D. Barbour, R.F.C.
2nd Lieut. C. H. Bartlett, R.F.C.
2nd Lieut. G. Cowie, R.F.C.
2nd Lieut. G. R. Edwards, R.F.C.
2nd Lieut. E. S. Faraghar, Lan. Fus.
2nd Lieut. F. B. Farquharson, R.F.C.
2nd Lieut. C. E. Ferguson, R.F.C.
Lieut. J. S. Godard, Can. Eng., attd. R.F.C.
2nd Lieut. K. L. Golding, R.F.C.
2nd Lieut. P. Goodbehere, Manch. R., attd. R.F.C.
2nd Lieut. B. Harker, Lan. Fus., attd. R.F.C.
2nd Lieut. A. E. Hempel, R.F.C.
Capt. H. O. W. Hill, R.F.C.
2nd Lieut. O. M. Hills, M.C., R.F.C.
Lieut. E. H. Kann, R.F.C.
2nd Lieut. J. D. Laing, R.F.C.
2nd Lieut. W. F. G. March, R.F.C.
Capt. J. T. Milne, M.C., R.F.C.
Capt. D. Owen, Can. Gen. List, attd. R.F.C.
2nd Lieut. S. M. Park, R.F.C.
2nd Lieut. B. B. Perry, R.F.C.
2nd Lieut. W. R. S. Smith, R.F.C.
2nd Lieut. R. B. Steele, I.A.R.O., attd. R.F.C.
2nd Lieut. G. H. Swann, R.F.C.
2nd Lieut. A. G. V. Taylor, I.A. Inf., att. R.F.C.
2nd Lieut. W. E. Watts, R.F.C.
Lieut. J. R. Wilson, R.E., att. R.F.C.
Lieut. S. Wright, M.C., R.E., attd. R.F.C.
2nd Lieut. F. L. Yeomans, R.F.C.

Previously Missing, now reported Prisoners in German hands.

Lieut. T. G. Deason, Yeo., attd. R.F.C.
2nd Lieut. E. A. V. Ellerbeck, Yeo., attd. R.F.C.
2nd Lieut. W. E. Hall, Lond. R., attd. R.F.C.
2nd Lieut. T. Humble, R.F.C.
2nd Lieut. H. Ibbotson, R.F.C.

Prisoner of War in German hands.

25052 Corpl. H. G. Bassenger, R.F.C.

Correction: **Previously Missing, now reported Killed.**

Lieut. G. E. Mall Smith, M.C., R.F.C., *should read* Lieut. G. E. Miall Smith, M.C., R.F.C.

FLIGHT

NOTES ON THE RUNNING OF AIRCRAFT ENGINES, FOR THE USE OF PILOTS.

By "GNOMAD."

It has frequently been the experience of the writer that a large proportion of flying officers are, very naturally, handicapped by a lack of knowledge regarding the vagaries of the engines fitted to modern aircraft.

It is the aim of the following notes to give a few hints and tips, in genuinely non-technical language, which, it is hoped, may be of some occasional service. The writer has seen the majority of the handbooks published by the flying services, and issued by the manufacturers, and one point seems to be common to both, *i.e.*, the absence of "running tips," whereas great importance is given to such details as clearances, tolerances, nature of metals, and so forth. These may be of the greatest value to engineer officers and air-mechanics, but are of comparatively small use to pilots.

It may be taken that the flying officers' interest in his engine starts at the moment when he approaches his machine in contemplation of a flight, and when "revs." are the one important point to be gained.

It may not be out of place to remark that few of the "hints and tips" here given have not proved of value during two and a half years' experience of nearly every aero engine in use in the two Flying Services.

Plugs.

It is generally admitted that plugs are one of the chief sources of small trouble to-day, and these troubles will not diminish as the efficiency of engines is increased. One is frequently asked "Which is the best plug?" and this question implies, in the writer's opinion, a misconception on the enquirer's part of the points met with in the plug problem. There is no "best plug"; a plug that will "stand up" in one engine is quite unsuitable in another, and this fact has been known to apply, even in the case of two engines of identical make and power. A 110 h.p. Clerget engine has been flown at full revs. when fitted with a set of 1*s.* 6*d.* motor cycle plugs, and after 1 hour and 40 minutes showed no signs of the indignity to which it had been subjected.

It has been thoroughly proved that inserting heated plugs in an engine, immediately prior to flight, eliminates a very large proportion of cases where the engine refuses to start. The heating of the plugs ensures that no water can be there, it helps the firing of a mixture which may not be perfect, and thick oil which comes in contact with a hot plug is not so liable to oil it up as would be the case if the plug were cold.

The above remarks apply particularly to rotary engines and to large water-cooled engines which are started by compressed air. In the latter instances, should the engine fail to start at the first attempt, condensation will almost invariably put several plugs out of action. This trouble may, to a great extent, be obviated by the use of heated plugs, which must only be inserted just before the engine is to be started, for, although the body of the plug may lose its heat very quickly on contact with the cold cylinder, the electrode will retain a very considerable amount of heat for some time. If, for any reason, the plugs should have lost their heat, it will always save time to remove them immediately after the first failure to start and, either replace them with a set of fresh *hot plugs*, or clean and heat the ones removed before replacing them. What may be very valuable minutes will be lost by making a second attempt to start up, even if the reason of the failure to start be such as failure to have the switch at "contact," or a wrong position of throttle. When once the compressed air has been admitted to the cylinders, water will be found to have collected on the plugs, unless the heat of the plug has been sufficient to evaporate it.

It will not be out of place here to mention that the nuisance of plug changing may be greatly diminished by training air-mechanics in a "plug changing stunt." In engines which may be required at short notice for urgent duty, a set of plugs which have been tested in that engine, and kept heated, can be inserted in an astonishingly short time by three mechanics who have been trained to work togther. The same remark, of course, applies to the changing of a set of plugs.

Twelve plugs (hot) under a closed cowl have been removed and new plugs (hot) inserted by 4 A.M.'s in under 50 seconds from the moment when the engine ceased to revolve! The threads of spare plugs should be kept slightly greased, and should invariably have been tried in their respective cylinders to ensure a quick change.

Too much attention cannot be paid to the gaps between the plug points. Inequalities in the gap may result, under certain conditions, in vibration and, of a certainty, destroy synchronous firing, even when it may not be noticeable to the pilot or engine hands. It is to be trusted that the reader will not deem some of these precautions meticulous. The writer once witnessed the failure of five out of eleven machines to start, owing to troubles which would not have occurred had the above precautions been taken, and owing to the particular circumstances of the case in point, this failure might have been attended by disastrous results.

Another point regarding plugs may be mentioned, viz., the effect of heat on plugs.

A great many rotary engines are started and almost immediately are opened "full out," and it is beyond doubt that, owing to the sudden heating of the plug points, strains are imposed on the plug which would not occur if the heat were more gradually raised. This has particular bearing on the gaps in certain types of plugs; gaps which have been most carefully set before insertion will be seriously disturbed by being suddenly subjected to their maximum temperature.

As is well known, the bottom plug in a rotary engine should be removed after flight, to prevent the collection of oil in the bottom cylinder when the engine is stationary, but a point that is frequently missed is that an engine that has been run until the oil is hot enough to become thin, is often stopped for an appreciable time before being run again, and it will often happen that during this time, sufficient oil will run into the bottom cylinder, or the adjacent one (which adjacent one depends on the direction of rotation, and plug position), to oil up the plug; hence it is advisable to turn the engine by means of the prop. in the time between the cessation of one flight and the beginning of the next.

(To be concluded.)

A PETROL ENGINE RING VALVE.
A COMPARISON WITH OTHER TYPES.

By A. E. HAMMOND.

THE internal combustion engine owes its origin to a French engineer in 1862—55 years ago—since which time the main features of the engine have practically remained unaltered. The great attention given to minor details has made it the lightest and most compact power producing plant extant to-day. Of the main features, the tappet type of valve has remained practically unaltered, simply because nothing better has been put forward, although engineers, with the smooth, silent-acting slide valve of the steam engine ever before their eyes, have felt that finality in valve design for internal combustion engines had not been reached. Many attempts have been made, especially in the last ten years, to supplement the poppet valve for something giving freer port area, quieter action, and greater durability. These attempts have consisted of disc valves, rotary valves, plug valves, cone valves, piston valves, long and short sleeve valves, and combinations of the same.

Many of these attempts failed because the internal pressures tended to lift the valve member off its seating and leak. Others having the full pressures on them were kept moving all the time, some were too difficult to properly oil or cool, others on account of their great reciprocating weight could not attain very high speeds, whilst the majority were slow in opening their ports. Many suffered from heat distortion and seizure, but whatever their faults they showed the desire to obtain something better than the tappet valve, which, like most of these valve systems, possesses faults of its own due to natural causes which cannot be eradicated.

To deal with the faults of the poppet or tappet valve first; we have a disc of metal mounted on a stem, and in the case of the exhaust valve, lifted directly into the escaping exhaust flame, it is closed by being suddenly snapped into its seating, hammering loose pieces of carbon into its hot surface. This tappet or hammering action makes it a noisy contrivance unless the necessary gap between the value stem and its push-rod is very nicely adjusted. Prolonged running deteriorates this valve, calling for frequent grinding to its seating—one of the dirtiest and most troublesome jobs imaginable, what with strong springs to contend with and the more often than not inaccessible and awkward position of the valve. Being unlubricated, wear takes place between the stem and its guide, often causing trouble due to leakage with both exhaust and inlet valves. The continual heating deteriorates the valve head, increasing its liability to snap off and fall into the cylinder with dire results. Other and natural faults are that, even with the best design, a sufficiently free and clear passage cannot be provided for the in or outgoing gases, whilst, in the case of the inlet valve, on shutting, gas is puffed back into the carburettor or inlet pipe.

Its good points are:—Light weight, enabling it to be run at high speeds; it can be actuated by cams, the most simple means of giving any desired timing, and the internal pressures help to hold it gas-tight on its seating; also it is cheap to make and replace.

Of the other types of valve the double long sleeve has been the most exploited, backed by unlimited capital and scientific research made necessary by certain inherent faults, some of which, owing to natural forces, cannot be overcome. This type provides an ideal shaped combustion chamber, gives a fair port area, with a smooth, lubricated, silent operation.

In this type the working cylinder is moved up and down, so that ports cut therein may be opened and closed by passing over a packing ring held stationary in a fixed cylinder head. This reciprocation of the working cylinder, being accomplished by an eccentric or crank mechanism at half engine speed, would open the ports too slowly, therefore another cylinder or sleeve, operating in the reverse direction, and outside the first, is employed to give the required rapidity. As these two sleeves weigh about 20 lbs., it would seem that speeds above 1,400 r.p.m. are fraught with the serious risk of breaking a sleeve, entailing a long and costly repair. However, it appears to the author a very roundabout way for opening two ports. A far more simple system is to be found in the short sleeve or ring type of valve, in which the ring itself forms the valve and is the only part moved. This valve may be likened to a broad piston ring, having a short reciprocating motion across two rings of circumferential ports, which in its central position it covers and seals, movement up and down uncovering one or other of the ports. The working surface for this valve conveniently consists of the cylinder bore itself, above the piston. The operation is by means of a light fork connected by means of rods to two pins projecting outside the cylinder at opposite points from the valve ring. The fork receives its motion, in one direction, from a cam and roller, a spring being used for the return. This keeps all the parts of the actuation in close contact, preventing noise—an impossible combination with the poppet valve, which must have a gap in its connection to allow it to seat firmly. The cam in this case is arranged to give the pause which is such a valuable asset to this valve, enabling it to remain at rest during the pressure periods. It is in this respect that it is an advantage on the steam engine slide valve, which has to move continuously under pressure. The ring valve, by being at rest, is thus able to take full advantage of the pressures, which help to seal it against leakage, also the actuating mechanism is relieved of undue strain thereby.

Large and free ports, rapidly opened and closed, are a first essential for high speed and efficiency, and a little comparison will show the enormous advantage in this respect possessed by this slide valve over the usual poppet valve. Take a 4-ins. bore engine for example. This should have a valve of $1\frac{3}{4}$ in. diameter, having a $\frac{3}{8}$ in. lift, the throat area available being $1\frac{1}{2}$ sq. in. The slide valve (of same bore), with its circumferential ring of ports, would, with the same valve lift, including its seal, give 2.98 sq. ins., or twice as much as the poppet. Even if the slide valve were only opened to give the same port area, it would still have the advantage of its direct gas flow, a thing a poppet valve can never have.

A fair idea of the durability of this system may be obtained by comparing this ring with a piston ring, the conditions being almost identical, except that the valve has the best of it, moving only one-twentieth of the distance travelled by the piston ring, and having eight to ten times its wearing surface. As to heating, true, its inside surface, is exposed to the explosion, but as this explosion presses the valve tightly to the water-cooled cylinder wall, it stands little chance of ever getting much hotter than the latter. It is also subject to the cooling effect of the inlet gas, which passes directly over its inner surface. As this valve works at a fairly moderate temperature, perfect lubrication is rendered possible, and it is interesting to observe how natural conditions within the engine are taken advantage of to bring this about, so we will follow this ring valve through its harmonious cycle of operations, and note what happens at each step. (Figs. 1, 2, 3 and 4.)

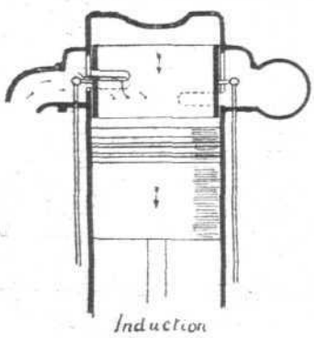


Fig. 1.

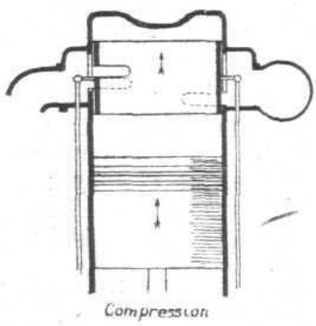


Fig 2.

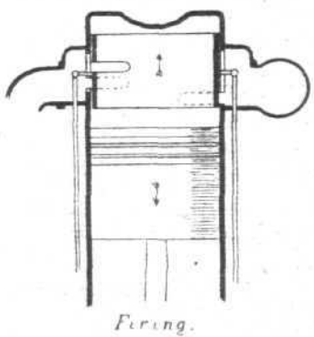


Fig. 3.

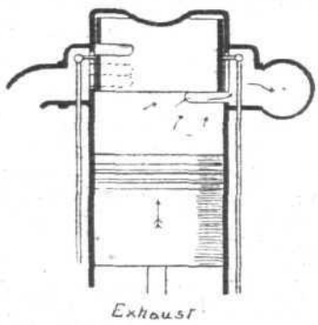


Fig. 4

A charge of explosive gas is drawn in on the induction stroke, Fig. 1, when the ring uncovers the inlet port, and when the piston ascends on the compression stroke (Fig. 2), the valve will then be in its central position, covering and sealing both rings of ports, and held stationary by its cam. The compressed gas, by slightly expanding the ring, tends to further seal the ports

against leakage. When the ascending piston has fully compressed the charge, ignition takes place (Fig. 3). The resulting explosion drives the piston down on its power stroke, putting more pressure on the still stationary valve, to move which at this stage would impose a great strain on the valve gear. But, fortunately, it is not necessary to move the valve till the piston has nearly reached its lowest point, and the expanding gas has fallen to less than 50 lbs. per sq. in. (quite a moderate loading, since we allow 400 for bearings). The cam has then begun to raise the valve, first uncovering the necessary overlap or seal, and then fully opening the exhaust ports, through which the ascending piston drives the burnt gas (Fig. 4). Before the piston reaches the end of this stroke, the valve commences to return, and closing the exhaust ports, travels quickly across the seal and opens the inlet ports. The descending piston then draws in a fresh charge of gas for the next cycle. Near the end of this stroke the cam lifts the valve back to its neutral or central position, closing the inlet ports on its way. The compression and explosion stroke then follows completing the cycle. The neutral position of the valve being arranged to just clear the highest point reached by the piston, it follows that in its descent to open the inlet ports, it passes over the oily surface just vacated by the top piston ring, and thus automatically spreads lubricant over its entire working surface, thereby usefully using up that oil that would otherwise form carbon and foul the combustion chamber. Cooling the piston is as vital a point as cooling the valve, and the nearer the piston can be to the jacket water the better. The poppet and ring valves score heavily in this respect over the long sleeve type, which has three oil films and three walls of metal between its piston and cooling media.

Not only does the piston suffer, but each sleeve, being necessarily a loose fit, also cannot get into close enough contact for perfect cooling. Selecting only the good points of the various valve systems, we find that a highly efficient high speed engine requires that :—

Its valves must be light, the lighter the better.

It should have a silent sliding action over a well-oiled and well-cooled surface.

Its internal pressure should help to seal and cool the valve, and no movement should take place during the maximum pressure.

A minimum movement should operate the maximum port area.

Exhaust ports should lead direct into pipes, so that the hot gases pass freely away, and do not heat up the cooling water unnecessarily.

Cam operation in one or both directions.

Cotters should be dispensed with on spring actuation.

The valve should have ample wearing and cooling surface, also be self-adjusting for wear.

The lubrication should be automatic and constant.

Its piston should be in direct contact with the water-cooled cylinder wall.

In manufacture it should not require any expensive operations ; replacements should be easily and cheaply accomplished.

Both the cylinder and its valve should be so designed that distortion by heat is avoided.

All actuation parts should be readily accessible.

The greatest power should be obtained with the smallest fuel and oil consumption.

All these advantages, it is claimed, are actually embodied in the Howard Slide Valve System—to which the foregoing description refers—a claim that is based on results obtained from engines using this valve which have been in use for the last seven years.

There appears to be no valid reason why it should not prove the solution of the engine trouble, for which our airmen often suffer so heavily, most of which can be attributed to valve failure. It, therefore, becomes a matter of National Policy that only the most efficient and reliable valve gear should be used on aero engines, and in the author's opinion this system is an ideal one for such work, since prolonged running merely burnishes the working surface of the valve to a mirror-like polish ; also, owing to its low fuel consumption per hour, less fuel need be carried, or a longer flight may be made with the same amount of fuel.

A further advantage with this valve is that the existing systems can be readily converted at small expense, as the alteration can in many cases be carried out in the detachable cylinder head.

In the Howard Slide Valve, patented in 1908, the object of the invention was to minimise the noise incidental to the usual mushroom valves used on internal combustion engines, to give a freer passage for the inlet and exhaust gases than they would have passing under the mushroom valve heads, and to provide means for lubrication. The following extract and diagrams from the patent specification of 1908 should give a general idea of this invention :—

The valve consists of a broad flat split ring covering annular slots cut through the walls of the working cylinder on opposite sides, and made to move within the cylinder in such manner that it opens or closes one of the said slots or ports at each end of its travel, its mid-position shutting both ports gas tight. The ring being split allows the full force of compression and explosion to hold it gas tight against the cylinder wall.

This valve, unlike other split ring valves, is designed to keep the combustion space clear of projections, rods, or arms, its actuating mechanism being attached to the ring from the outside, through the cylinder walls, to two trunnion pins, which project outside the cylinder walls, through vertical slots in the latter. The ring is made broad enough to cover these slots when the ports are closed. The lower edge of the ring uncovers the exhaust port, which is cut lower, by its own width, than the inlet port, which is preferaby opened by a registering port or ports cut through the ring itself ; or the ports can be reversed, the lower one being used as the inlet.

To lubricate the working surfaces the lower edge of the ring is made to overlap the path of the piston, and so use the lubricant brought up by a shoulder on the latter.

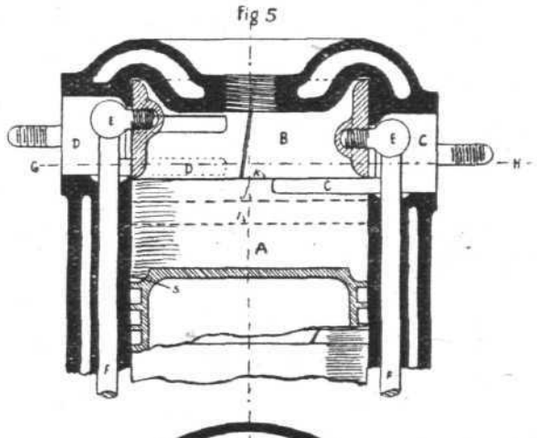
When the ring is in its mid-position, j, Fig. 5, its lower edge just clears the highest point reached by the shoulder *S* on the piston.

The valve may be operated by a grooved cam in both directions, worked on the two-to-one shaft, or by a surface cam in one direction, return being by a spring or springs.

The cam used must be so shaped that it will hold the ring stationary during the compression and seven-eighths of the firing stroke.

The cam-shaft can be arranged overhead to work the valve by a bridge-piece and central roller follower, the ends of the bridge being connected by rods to the trunnion pins. Or the rods can work from below by cam mechanism in the engine base, as shown in the accompanying drawings, in which :—

Fig 5



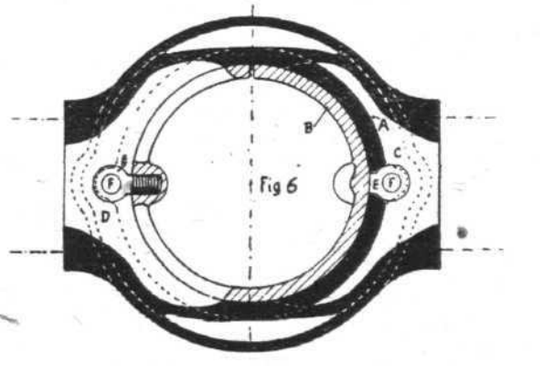


Fig 6

Fig. 5 shows a vertical section through cylinder and ring with the exhaust port open.

Fig. 6 is a section across line *G*, *H* with the inlet port open.

The dotted lines *i*, *j*, and *k* show the three positions of the valve. *A* is the cylinder, *B* the split ring valve, *C* the exhaust port, *D* the inlet port, *E*, *E*, the trunnion pins, *F*, *F*, the actuating rods, *S* the shoulder on piston.

In two-stroke engines, where it is essential to get a very free passage for the gases, one ring may be used for the inlet, with the exhaust by terminal ports, or the reverse.

The method of lubrication previously described, where oil brought up on the piston and collected on a shoulder formed thereon is utilised for lubricating the ring valve, is subject to the disadvantage that the piston cannot be relied upon to

distribute the lubricant equally, as, owing to the clearance between the top of the piston and the cylinder wall above the usual top piston packing ring, the oil ridge carried up by the piston is of unequal thickness, and an excess is liable to occur on one side and a deficiency on the other. To obviate this difficulty the following arrangement, which forms the object of another patent, has been employed. This arrangement consists of the provision of an elastic oil distribution ring, the inner edge of which is approximately co-incident

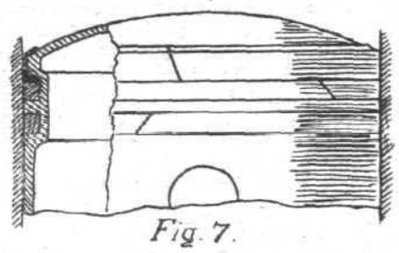


Fig. 7.

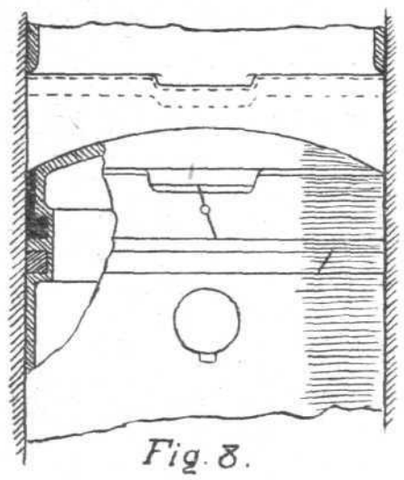


Fig. 8.

with, and extends beyond, the upper end of the piston so that an even ridge of oil is carried by this ring to such a position on the cylinder wall (or in a recess or enlargement of the cylinder) that the ring valve in its travel will wipe over it and cause it to smear or spread over the working surface. Ordinarily, it is sufficient if the inner edge of the oil distribution ring approaches so closely to the farthest point within the cylinder covered by the valve ring in its travel that the valve ring touches the residual ridge of oil, but for high speed work and in cases where there is a limited supply of oil, it has been found an advantage to allow overlap between the travel of such piston ring and the valve ring.

In the accompanying drawing (Fig. 7) is an elevational view, partly in section, of a piston fitted with an oil collecting and distributing ring in accordance with this invention.

Fig. 8 is a similar view of a piston and a ring valve illustrating an arrangement wherein the inner piston packing ring is extended to form the oil distributing ring also.

Fig. 9 is a view illustrating how a storage recess can be formed in the cylinder wall, and

Fig. 10 is a similar view illustrating the case where the portion of the cylinder traversed by the ring valve is of smaller diameter than the main portion of the cylinder.

Referring to these drawings, and particularly to Fig. 7, where a spring ring is attached to the piston by an internal flange, which may, or may not, share the groove with the top packing ring. This ring may be spun or rolled from thin metal, its top flange being shaped as shown to confine the oil to the cylinder wall, and prevent it spreading over the piston crown, from which it would be thrown into the combustion space instead of being delivered where required.

Fig. 8 shows a stepped ring (shown black) acting also as a packing ring, and having its upper edge higher than the top edge of groove carrying such ring. In this ring a recess is cut away to clear a lug on the valve ring, thus ensuring an even approach on overlap between the piston ring and the valve without in any way impairing the packing qualities of the ring.

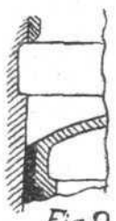


Fig 9.

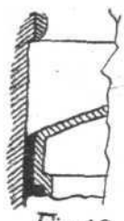


Fig.10.

In the arrangement shown in the drawings, overlapping is provided for, the top dotted line representing the highest point reached by the top edge of the oil collecting and distributing ring, which as aforesaid also acts as a packing ring, and the lower dotted line represents the lowest point reached by the ring valve.

In Fig. 9 is shown a recess, which may be circumferential or only partially so as may be desired, and it will be understood that in operation the oil collecting and distributing ring carried by the piston pushes the oil up into this recess, and the ring valve in its traverse past the lower edge of the recess becomes adequately lubricated. Care must be taken that the top edge of the distribution ring approaches so closely or overuns the bottom edge of the storage recess as to ensure the lubricant being deposited on the lower edge groove.

In Fig. 10 the effect is somewhat similar, the distributing ring pushes the oil up and a ridge of oil collects on the cylinder wall beneath the shoulder formed where the cylinder is made smaller in diameter, and as the ring valve passes this shoulder its working face becomes lubricated in a manner which will be readily apparent. It is to be particularly noticed that the difference of diameter of the bores is only such that the descending ring valve will wipe over or touch the face of the oil ridge left by the lubricant distributing ring instead of pushing such ridge down.

Fatal Accidents.

A VERDICT of "Accidental Death" was returned at a Norfolk village on October 30th on the body of Lieut. C. H. McNeill, Canadian Force, attached R.F.C., who was killed while piloting a biplane.

An aeroplane in the charge of Lieut. W. F. King and Lieut. Crosby, of the R.F.C., was flying over Hounslow about noon on November 3rd when it descended out of control, and fell on the heath between two hospital huts, in which were many patients. The machine burst into flames, and in a few minutes was completely destroyed. The bodies of the two officers, which were badly burned, were conveyed to the mortuary. One of the huts was set on fire, but the flames were extinguished before any material damage was done.

While a practice flight was taking place in East Kent on the afternoon of November 3rd an accident occurred to one of the larger type of British machines. It was carrying several passengers, in addition to the pilot, and had almost reached the ground when it suddenly burst into flames, and as a result Flight Sub-Lieut. J. St. James, R.N., the pilot, Flight Sub-Lieut. W. A. Isaacs, R.N., and Prob. Flight Officer T. R. Weston, R.N., were killed, and Prob. Flight Officers Smith and Hervey seriously injured. At the inquest it was stated that after circling twice the machine was flying at a low altitude when the right wing tip struck the ground. The machine turned turtle and caught fire. Verdicts of "Death from Misadventure" were returned.

A captain of the Royal Flying Corps, who was flying over the Thames at Dartford on Saturday, got into difficulties, and his machine fell on to a barge going down the river. He was killed and the observer was seriously injured.

Lieut. G. C. Mills, R.F.C., was making an aeroplane flight in South Hampshire on Sunday, and when about 600 ft. up his machine came into collision with another aeroplane. The former crashed to the ground, and Lieut. Mills was picked up dead. The officer in the second aeroplane effected a safe landing.

Lieut. D. Bispham, R.F.C., was killed at Cricklewood. He was about to land, when the machine, nose-diving at a height of about 80 ft., fell to the ground.

A verdict of "Death by Misadventure" was returned at an inquest at Dartford on November 5th on Capt. H. H. Griffith, R.F.C., who met with a fatal accident on November 2nd. According to the evidence deceased went up with a sergeant for the purpose of testing the engine of an aeroplane, and after ascending to a height of 800 ft. he looped the loop. The machine made a nose-dive and crashed on a barge which was being towed up the Thames. Capt. Griffith was instantly killed and the sergeant was seriously injured.

A verdict of "Misadventure" was returned at an inquest at Napsbury War Hospital on November 5th, concerning the death of 2nd Lieut. L. H. Smith, who was killed while flying on November 2nd, with a pupil, Lieut. Douglas Ball. Lieut. Smith was picked up unconscious, and died five minutes after admission to Napsbury Hospital.

FLIGHT

AVIATION IN IRELAND.

THERE is a classic story of a book dealing with Iceland (or was it Ireland ?) in which a chapter on "Snakes in Iceland" contained simply the words, "There are no snakes in Iceland." Something similar might be written regarding aviation in Ireland at the present time. There may be aeroplanes, but we never see any. There may be aircraft factories, but if so they are hidden away in villages the names of which no one can pronounce.

Before the war one or two aeroplanes had been seen at the famous Leopardstown racecourse, and the writer, in 1912, accompanied the first aeroplane which visited the South of Ireland. But since 1914 aeroplanes have apparently ceased to fly in this direction. Yet we are a sporting people, and there are many youngsters who would form good material for the Flying Services if they first had an opportunity of seeing what aeroplanes are now capable of doing.

Away in the remote parts of the country there are very many people who would not recognise an aeroplane if they saw one, though they know, by first hand evidence, what a submarine can achieve.

There is no lack of sites for aircraft factories or for aerodromes. Dublin City should prove an excellent centre for aircraft factories. There are woodworking machines doing very little work owing to the shortage of timber. There is plenty of labour, both male and female, skilled and unskilled. According to official returns unemployment is thirteen times greater in the principal trades in Ireland than in the principal trades in England. A hundred or so girls in Dublin are being provided with occupation, and 6s. a week, simply as a relief measure, and other hundreds could be got as easily if work were available.

Ireland is on the direct air highway to America. When transatlantic flights take place there will certainly be some landing stations in Ireland. No part of the kingdom will benefit more from a daily air service. For the first time, in most parts of the country, when the air service is established, it will be possible to read a London morning paper on the day it is published. Henry Ford has found a convenient site for his motor works in Cork. Belfast has its shipbuilding. Dublin is the ideal centre for the Irish aerial service.

It is the opinion of some of the best judges of the situation that a little later prosperity will settle on Ireland which will well repay anyone who takes advantage of the opportunity to make aeroplanes or aeroplane parts in the country. Quite recently the London City and Midland Bank has acquired the Belfast Bank, a bank which has considerably extended its interests outside the Belfast district. This purchase has now been followed by the purchase by the London County and Westminster Bank of the Ulster Bank, a bank which has branches not only in Ulster but throughout the South of Ireland.

There is apt to be an impression that the employer and manufacturer has a bad time in Ireland—it is only an impression. Things are different, but they are not worse for the employer. On the contrary, much less is expected in the way of progressive methods and scientific management. It is easy to lose perspective about Ireland. But if the aeroplane manufacturer makes his investigations about Irish sites as he would about sites in England—giving the partisans a wide berth—he will see that agricultural Ireland provides immediate advantages and great prospective opportunities when the oldest and the newest industries—agriculture and aircraft—come into their rightful place after the war.

R. H. A.

LONDON'S AIR DEFENCES.

SOME interesting details regarding the defences of London were given both by Lord Cowdray, President of the Air Board, and Major-General E. B. Ashmore, commanding the air defences of the London area, at the opening of the official Air Services Exhibition, organised by Lady Drogheda, at the People's Palace, Mile End Road, E.

Lord Cowdray emphasised that the task of the Air Board was no small one. There were hundreds upon hundreds of thousands of men and women engaged in the manufacture of aircraft. On these men and women depended the future of England. The machines which they were now producing could rise to a height at which breathing was difficult for most people, impossible for some, and at which relief could be obtained only by the use of oxygen. They had a greater speed than double that of the quickest express train. They were being manufactured at a great and ever increasing rate. The night of October 31st had been an anxious one to many of the residents of Greater London, but we had to realise at the same time that the momentary inconvenience and strain which these raids involved were nothing compared with the demands being made upon the Navy, Army, and Air Service. These raids had only one object. The enemy hoped that they would have the effect of bringing about peace. He had yet to know the Englishman who was afraid of warfare of this kind, and he was sure the country was with the Government in being determined that the Germans would have to pay in numbers, in deaths, and in money eventually for all the damage and injury they were doing just now.

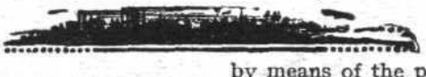
Major-General E. B. Ashmore said that London for the purposes of the air was as much on the battle-front as any town on the Continent. The Germans came here as often and in as great strength as they could. The effect of the arrangements made by Lord French was that of the German aircraft which came over nine-tenths failed to attain their objective. We could not make absolutely certain yet that no German machine would reach a great place like London. If we had all the machines, guns, and lights in the world we could not prevent this—at present. But we had stopped for the time, at any rate, attacks by day, and attacks by day were far more dangerous than attacks by night. When they came by night, only about one in ten got through the defences In the Zeppelin raid on Friday week there were 10 Zeppelins, each capable of carrying about 10 tons of bombs.

On the night of October 31st the Germans made seven particular attacks. Of these seven attacks, six were stopped by our barrage and other arrangements. In the seventh attack, two, or at the most three, machines got through. But the effect of these raids was extremely small, owing to the defences, compared with the efforts which the Germans put forth. It was impossible to stop them altogether. A town near the coast in France had been bombed on 50 nights out of the last 60.

They were doing their best day and night to defeat the Huns who came over. He did not think it would be altogether politic to hang them whenever a bomb was dropped in London. It would be expensive from the point of view of *personnel*, and he was not sure that they would be much better off when they had hung them all. The anti-aircraft men were very keen, very well trained, and very capable. We had also very good machines flown by pilots second to none in the world. He had under him pilots who would take up fast machines, machines that could go high, and therefore must fly fast, and also land fast. They took up these machines not only on moonlight nights, but upon black nights.

Mr Joynson-Hicks said he did not think England realised how much we owed to Lord Cowdray's work at the Air Board. Before very long the powers of the Board would be enlarged and extended.

The exhibition, which has had several small additions made to it since it was first opened at the Grosvenor Galleries, is for the benefit of the Flying Services hospitals. A characteristic notice by Lady Drogheda runs as follows:—"If you think that this exhibition—and its object—are worth more to you than the entrance money paid, you can even things by putting an extra donation into this nice box"—a model airship. Manufacturing firms are invited to contribute. Cheques should be made payable to the Flying Corps Hospital Fund, and addressed to the Countess of Drogheda, 40, Wilton Crescent, S.W. Admission from 10 a.m. to 4 p.m. is 1s.; from 4 p.m. to 10 p.m., 6d.; children, 3d. The nearest Underground stations are Stepney Green and Mile End.



Stresses and the Polariscope.

AN important subject will be dealt with by Dr. E. G. Coker in his paper on "Photo Elasticity for Engineers," to be read before the Institution of Automobile Engineers on Wednesday, November 14th, at 8 p.m. The further researches which he has been making on the demonstration of stresses by means of the polariscope, will be described by Dr. Coker, and for this purpose the principal illustrations will be shown by means of a lantern. The meeting will be held in the Physics Lecture Room of the University College, Gower Street, W., and anyone wishing to attend can obtain an invitation on application to Mr. Basil H. Joy, Sec., I.A.E., 28, Victoria Street, S.W.1.

AIRISMS FROM THE FOUR WINDS

"DURING the night of November 1st-2nd our airmen dropped bombs on London, Chatham, Gravesend, Ramsgate, Margate and Dunkirk. Big fires showed the satisfactory results of our attack." So runs last Saturday night's German official report (Admiralty per Wireless Press). It is curious, however, that nobody noticed it that night. But perhaps the Hun is mixing his dates as well as his facts, since an official telegram from Berlin *vid* Amsterdam (per Reuter) speaks of a raid on the night of October 31st-November 1st.

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FOR the first time a lady has been elected an Associate Fellow of the Aeronautical Society. Miss Eily Marguerite L. Keary, of the National Physical Laboratory, who has been honoured by this high qualification in the Society's membership, took Honours in the Mechanical Science Tripos at Cambridge, and has done a good deal of experimental and research work in aeronautics both at Cambridge and Teddington.

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ONE element displaces the other. Is it an omen of the future ascendency of aviation over sea-power? The Air Ministry is taking over the head offices of the Metropolitan Water Board in Savoy Court, Strand, for its official quarters.

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Now we know where we are. According to a Rotherhithe statistician, after "careful calculation," the individual risk of being hit in an air raid is 69,990 to 1 against. Nothing like being exact.

ANOTHER example of the fatuousness of divided local authority, when general public policy is at stake, is well brought out in the variety of warning methods against air-raids which each borough, being a power unto itself, is promulgating. One elects to show green lights as "Take Cover" notice; another selects red for the same purpose; yet another introduces electric illuminated signs, like unto the Underground train indicators, and so on and so forth, so that any benighted pedestrian who happens to stray a few yards beyond his own parish boundary may well find himself inconveniently the centre of Hun bombs and British shrapnel, merely by reason of his not being conversant with the particular choice of warning which prevails in that immediate locality. Whatever the notes of alarm and all clear are, they should be uniform for the metropolis. To allow parochial æsthetics each to have a voice in the matter is a mistake, serious almost to criminality.

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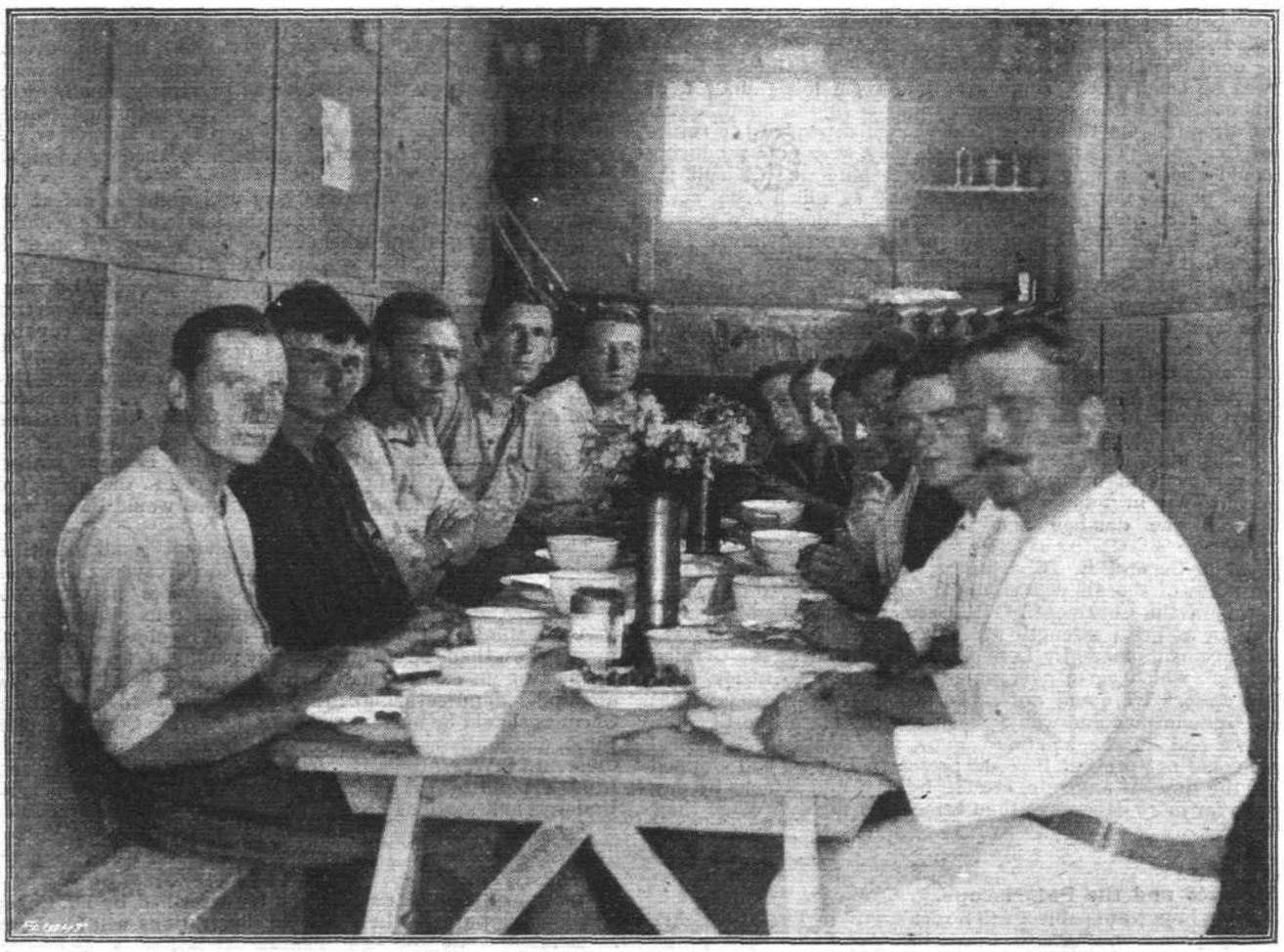
SOUNDS rather mean for the Home Office to disown responsibility in regard to any Boy Scout buglers who may receive injury whilst on duty during air-raids when they are on the alert to notify "all clear." It is therefore much to the credit of Messrs. Savage, Sussens and Co., of Finsbury Pavement, who have offered to make a present of a Lloyds' policy to cover 350 of these lads. Under this, the parents of any little patriot who may be killed while on duty, by bombs or shrapnel, will receive £50 and a scout injured under like



Unique utilisation, as a mess room, of an aeroplane packing case by the R.N.A.S. in the Eastern Mediterranean. Note the shell cases as flower vases.

conditions will get £25 for medical expenses. The British Government is indeed generous to its maimed heroes.

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THOSE new Zeppelins with new silent motors are once again disporting themselves over Lake Constance. "Silent" in this case is a relative term.

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IT looks as if the British seamen really mean business over the after-the-war Hun boycott. And it should be had in mind that, so they only hang together, they have the power to carry through their threats, Government or no Government. A period of two years and seven months has already been fixed for barring German shipping, with a further promise of one month extra for every air-raid and every mercantile ship sunk. We only hope Mr. Havelock Wilson will be able to keep the seamen up to it.

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THESE are ticklish times, and most folk will therefore applaud Lord Montagu's decision to withdraw his motion and question in the House of Lords down for Tuesday last, as to the air-raids in London and the means which might be taken to defend the capital and people. There are so many possible snags in a public discussion upon the subject just now, that it may well be the greater safety is to be found in *not* discussing ways and means for the benefit and guidance of the enemy at our gates. The movement in the Commons to put a check upon some of the hecklers of the House is coming none too soon. There are some who, from their methods would, in olden days, long since have been laid by the heels in the Tower under such circumstances as now exist.

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MAYBE *all* of German nationality still at large in England are not over infatuated with Hunnish methods and ambitions in this war, but at the same time it does not suggest *excessive* caution on the part of the authorities, whilst allowing for latitude in permitting certain liberty to really inoffensive German citizens, if there be such an one, to allow our young girls to be guided by German women, however inoffensive, ostensibly, they may be. Yet it would appear from a case on Monday at the Croydon Police Court, that one Emmile Fluks, confessing herself a German, has been in charge for 10 years of the Croydon Lodge of the Girls' Friendly Society. Emmile was summoned for failing to register a "lodger," who she received with two children into her house as the result of an air-raid. No wonder "peaceful penetration" has been a success in the pre-war years that have gone.

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A CLASSIFICATION of safety shelters during air raids has been undertaken by the Royal Institute of British Architects. The President, Mr. H. T. Hare, has explained that for this useful work a sub-committee of the Architects' War Committee has formulated a scheme for the examination and registration of all properties within the area of the London County Council which are suitable or relatively safe as refuges for the public. This is very carefully drawn up, and the employment of architects is suggested under the direction of the district surveyors. The scheme has been indicated in general terms to Sir Edward Henry, and was now under consideration. A small committee has also been appointed to investigate the effect of bombs falling on or striking buildings, and valuable information should no doubt be obtained as to the materials and methods of construction that were the best calculated to resist the effect of high explosives.

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DURING their tour in the West this week, the King and Queen are visiting on Thursday the wonderful works of the British and Colonial Aeroplane Manufacturing Co., the home of the "Bristol" scout and other fearsome fowl of the air. On Friday the splendid factory of the Avon India Rubber Co. at Melksham, willl be inspected by Their Majesties.

TEN YEARS AGO.

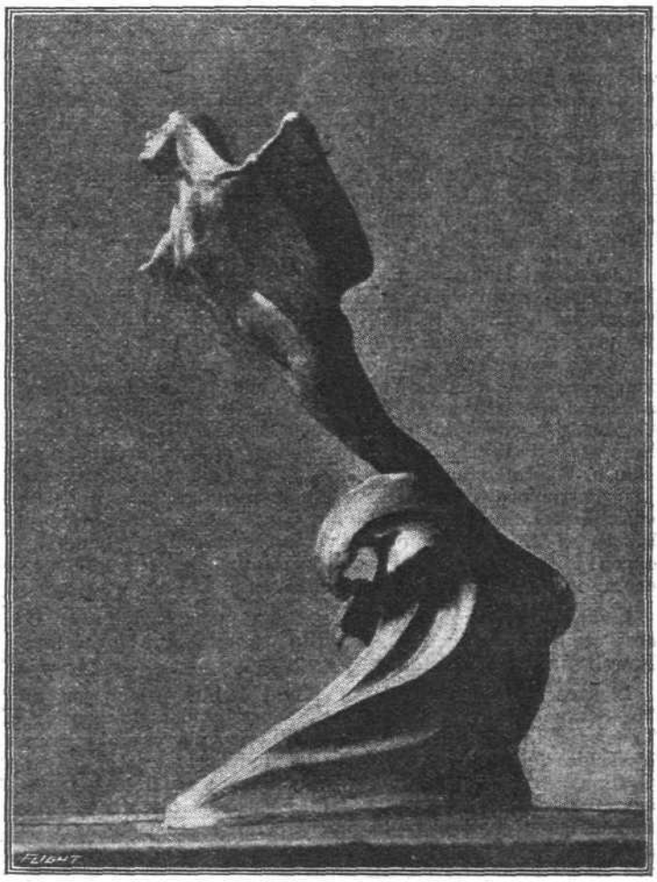
Excerpts from the "Auto." ("FLIGHT'S" precursor and sister Journal) of November, 1907. "FLIGHT" was founded in 1908.

M. ESNAULT-PELTERIE'S EXPERIMENTS.

As the result of careful study and systematic work during the past three years, Mons. Robert Esnault-Pelterie has recently evolved a remarkable type of winged motor-propelled machine, with which he is able to career along over fairly level ground in a succession of long leaps through the air, and with short intervening runs on the small wheels with which it is provided. On October 22nd, at Buc, near Versailles, he gave a most successful demonstration to a small gathering of interested personages, keeping the machine travelling for about an hour and a half during the afternoon without meeting any sort of troubles. When in the air, leaps of from 100 to 150 metres were made at a height of 2 to 3 metres above the ground, and when again alighting on the wheels, short runs were made without appreciably travelling any more slowly. The machine itself, which is rather like a huge butterfly, has a torpedo-shaped body weighing 20 kilogs.; curved wings of 15 sq. m. surface (and weighing 60 kilogs.) projecting on either side; a horizontal rudder-tail weighing 10 kilogs.; a specially-shaped 7-cylinder motor (weighing 44 kilogs. and giving 25 h.p.) in front; and a large fan-bladed tractor-screw (weighing 11 kilogs.) on the front end of the 2½ kilog. crank-shaft. Beneath the body is accommodation for the driver (weight 75 kilogs.), and immediately beneath him are the wheels, which, with their mountings, weigh 10 kilogs. Complete, in working order, it therefore weighed, with 10 kilogs. of petrol, 240 kilogs.

M. HENRI FARMAN'S PROGRESS.

Remarkably encouraging results are rewarding the persevering efforts of M. Farman to master his aeroplane. Again last week he was out several time with his machine at Issy, the greatest interest being taken in his work by the Archduke Leopold Salvator of Austria, who has personally attended at M. Farman's flying experiments. On October 23rd he was progressively successful, and was able to make a series of flights extending over distances of 186 metres in 15⅘ seconds, at a height of 2 metres from the ground, over 150 metres in 15⅘ seconds, and 122 metres in 11 seconds. By the first flight, M. Farman has secured the prize offered by the Aero Club of France for a flight over 150 metres. On October 26th, hoewver, M. Farman secured an even greater triumph, by creating a remarkable record flight of 771 metres, almost equivalent to half a mile flight.



The Hydro-Aero Maid, suggested trophy of the New York Flying Yacht Club, for which an annual international contest is proposed to be held to be known as the Manhattan Island Derby, a speed event, distance 45 miles.

First Prize, New York Flying Yacht Club Trophy and $3,000 cash.
Second Prize, $1,500 cash.
Third Prize, $500 cash.

The trophy, which is the work of A. Popini, becomes the property of the club winning it three consecutive years.

Casualties.

CAPTAIN J. C. A. CAUNTER, The Welsh Regiment and R.F.C., who was killed in action on October 28th, was the only son of Brigadier-General and Mrs. Caunter.

Lieutenant JAMES CRAFTER, M.C., R.F.C., was reported missing on July 7th last. News has now been received that he was killed on that date while flying over the German lines. He was 23 years of age, and the second son killed in the war of Mr. Tom Crafter, the veteran athlete and president of the Blackheath Harriers, of 96, Stondon Park, Forest Hill, S.E. He was the hon. secretary of the Blackheath Lacrosse Club and a member of the Blackheath Harriers, and had represented "Insurance" in the annual Banks, Insurance, and Stock Exchange walking match on several occasions. He was also a keen cricketer, swimmer, and water polo player. With his brother Tom he went to France with the 1st Battalion of the London Scottish in September, 1914, and eventually attained the rank of sergeant in the machine-gun section. He was gazetted to the London Regiment and was awarded the Military Cross. Later he was attached for a short time to the K.R.R.C., and afterwards became a pilot in the Royal Flying Corps.

Second Lieutenant HENRY JAMES CREMONINI, R.F.C., who was killed on October 18th, was the only son of Mr. Anthony Cremonini, of Kelvedon, Solihull. He received his early education at Ratcliffe College, Leicester.

Captain D. W. EDWARDS, M.C., A.S.C., attached R.F.C., reported missing on April 6th, and now reported killed in action on that date, was the younger son of Captain C. R. Edwards, R.A.M.C., and Mrs. Edwards and husband of Cicely G. K. Edwards, 42, Powis Square, Bayswater.

Lieutenant BERNARD EVANS, R.F.C., was the third son of Mr. Edwin Evans, J.P., and member of the L.C.C. for the Wandsworth Division, and of Mrs. Evans, of Ravenslea, Wandsworth Common. He was one of four brothers, three of whom voluntarily enlisted soon after war broke out, the fourth being rejected on medical grounds. Lieut. Evans was educated at Marlborough, and subsequently at Trinity College, Cambridge, where he graduated B.A. and LL.B. At the time of enlisting he was a practising solicitor at Stangate House, Westminster Bridge Road, S.E. Later he became a Lieutenant in the Middlesex Regiment, and subsequently volunteered for the Royal Flying Corps. On Easter Sunday last, April 8th, he went up with a small squadron on a bombing expedition, and was surrounded by a much larger number of enemy machines and killed. He leaves a widow.

Lieutenant ANDREW JOHNSTON, R.F.C., who died of wounds on October 30th, aged 20, was the youngest son of the late Fowell Buxton Johnston.

Lieutenant EDWARD HUGH KEIR, R.F.C., elder son of Mr. Samuel Keir, secretary of the Royal Albert Institution, Lancaster, the well-known Lancashire chess player and former Yorkshire journalist. He was educated at Lancaster Royal Grammar School, and joined the forces in 1914, securing a commission from the O.T.C. of Lancaster Grammer School in the Royal Lancaster Regiment. For some time he was on the staff of a school of instruction, and was transferred into the Royal Flying Corps. He had been at the front for three months, and was killed after a gallant fight on Sunday, October 28th.

Lieutenant JUSTIN MCKENNA, R.F.C., previously reported missing, is now stated to have been killed. He was the son of Mr. Theodore McKenna (Messrs. McKenna and Co., Solicitors) and a nephew of the Right Hon. R. McKenna, M.P., formerly Chancellor of the Exchequer. The officer had great artistic talent, and as a satirical draughtsman had already had a hand in two publications, the last of which, the "Hun-Hunters," was published a few months ago. He met his death in one of his first flights in France. His two brothers are both on active service, the one in the Navy and the other in the Flying Corps.

Lieutenant DONALD ST. P. PRINCE-SMITH, Royal Dublin Fusiliers, attd. R.F.C., who was killed in action on October 24th, was the only son of W. A. Prince-Smith, Allahabad, India, and husband of Peggy Prince-Smith, The Bungalow, Kilcool, Co. Wicklow, Ireland.

Lieutenant FRANK TREVOR WAKEMAN, Royal Warwickshire Regiment, and R.F.C., was killed on October 30th, in his 20th year. He was the eldest son of Mr. and Mrs. Frank J. Wakeman, of The Dene, Bushey, Herts., and was educated at Cambridge House School, Margate, and West Buckland School, North Devon. He joined the Artists' Rifles in April, 1915, and was gazetted a second lieutenant in the Royal Warwickshire Regiment in October of that year. He went to France in the following December, and was severely wounded in February, 1916. After six months in hospital and convalescent home he rejoined his regiment, and was shortly afterwards transferred to the R.F.C. He spent the winter of 1916-17 in Egypt, and on returning to this country in May he obtained his "wings" and in the same month went to the front. He was promoted to lieutenant in July, in which month he was again wounded. His flight commander speaks of him as a valuable pilot.

Captain CYRIL WALTER CARLETON WASEY, Royal Warwickshire Regiment, attached R.F.C., who was killed on October 28th, was the eldest and only surviving son of Mr. and Mrs. G. K. Wasey, of Leigh Hill, Savernake Forest. He was born in 1893 and educated at Eton and Sandhurst. He joined the Royal Warwick Regiment in March, 1913, and went to France with the Expeditionary Force in August, 1914. He was twice wounded. He was awarded the Legion of Honour for gallantry during the retreat from Mons, and was mentioned in one of Lord French's dispatches. He joined the R.F.C. last summer, and after completing his course as an observer had only been back at the front about six weeks.

Lieutenant RONALD JOHN SAXTON WHITE, Canadian Infantry, attached to R.F.C., who died abroad on October 27th of septic poisoning following wounds, was the youngest son of Mr. and Mrs. William Henry White, late of Charlwood Park, Surrey. His age was 25.

Second Lieutenant LEWIS HAYES WHITFIELD, R.F.C., who died of wounds on October 30th, was the elder son of Mr. and Mrs. Lewis L. Whitfield, of 42, Wandsworth Bridge Road, Fulham, S.W.

Second Lieutenant HUGH HOLTOM WHYTEHEAD, R.F.C., was educated at St. Ninian's, Moffat, and Shrewsbury, where he shot for the school at Bisley. He entered Birmingham University as a student of oil mining in 1913, but joined the Army as soon as war broke out as a private in 5th North Staffordshire Regiment. He obtained a commission in 9th North Staffordshire Regiment, and served in France some months. Afterwards he served as a motor-dispatch rider, then joined the R.F.C., and went out to the front as pilot on June 23rd last. He went over the lines with a patrol on July 12th. He and another pilot failed to return, and since then news has been received from a prisoner in Germany that he was brought down dead on that day.

Flight Lieutenant ARTHUR FRANK BRANDON, D.S.C., R.N., who was killed on October 26th as the result of a collision in the air, was the third son of the late Charles Brandon, of Montreal, Ladysmith, Natal. He was educated at Michaelhouse School and Cedara College, Natal, and he served with the South African contingent throughout the German South-West African campaign, after which he came to England and received a commission in the R.N.A.S. He was sent to Salonica in 1916, where he did good service, and was invalided home last July, and had recently been stationed at an aerodrome on the south-east coast. He had recently brought down a Gotha, for which service he was awarded the Distinguished Service Cross.

Second Lieutenant LESLIE SIDNEY HUDSON, Gloucestershire Regiment, attached R.F.C., younger son of Mr. and Mrs. Sidney Hudson, was accidentally killed while flying on October 27th, aged 20. He was educated at the Imperial Service College and Newton College, and joined the Forces in August, 1914, at the age of 17.

Married.

On October 31st, at St. Albans, Hertfordshire, Major WILLIAM BOWEN HARGRAVE, R.F.C., elder son of Lieut. H. J. HARGRAVE, R.A.M.C., was married to ETHEL MAY, second daughter of the late Mr. W. F. BATSFORD, of Ilford, Essex.

On October 28th, at Holy Trinity, Marylebone, Second Lieutenant WILLIAM ILAM VANE HUNT, R.F.C., only son of the late Rev. William Hunt, Rector of Killymard, was married to MURIEL, elder daughter of Arthur W. SOAMES, M.P., 18, Park Crescent, W. 1.

Captain D. F. STEVENSON, M.C., Yeomanry and R.F.C., youngest son of Lieutenant-Colonel J. Stevenson, B.Sc., F.R.C.S., M.B., Glen Rowan, Doncaster, and the late Mrs. Margaret Stevenson, was married on October 31st to JANET MARY, younger daughter of the late J. R. HENSON, LL.D., and Mrs. Henson, of Hornsea, East Yorks.

On October 11th, at Slough, Bucks, Second Lieutenant RONALD Q. THOMAS, R.F.C., was married to MARY ISABELLA, second daughter of the late Colonel and Mrs. FRANKLIN, of Clemenstone, Cowbridge, Glamorganshire.

Major B. H. TURNER, R.F.C., was married on November 1st in St. Luke's Church, Chelsea, to HELEN, eldest daughter of the late Sir George FARRAR, D.S.O., and Lady Farrar.

To be Married.

The marriage arranged between Flight Lieutenant W. A. MEADE, R.N., and VERA CUBITT, eldest daughter of Count and Countess RICCARDI-CUBITT, will take place, leave permitting, on November 19th, in the private chapel at Eden Hall, Edenbridge, Kent.

The engagement is announced between Flight Commander C. H. CHICHESTER SMITH, D.S.C., R.N., younger son of Mr. and Mrs. C. J. Smith, late of Buldeigh, Salterton, and Exeter, Devon, and NORAH, second daughter of Mr. and Mrs. W. P. CUBITT, of Bacton Abbey, Norfolk.

The marriage arranged between Flight Lieutenant NORMAN EDWARD WOODS, R.N., and Miss FLORENCE INNES PERKINS will take place at St. Mary's, Wimbledon, on November 17th.

Items.

Information has been received that Lieutenant DUNCAN MACRAE, Seaforth Highlanders, attached R.F.C. (Lord of the Manors of Fornham St. Genevieve and Fornham St. Martin, Suffolk, under the will of the late Sir William Gilsrap, Bart.), only son of Colonel and Mrs. MacRae-Gilstrap, of Eilean Donan, Ross-shire, and Ballimore, Argyll, who has been missing for some time, is a prisoner with his observer, Lieutenant Blake, R.F.C., who are both reported by the Turks to be unwounded.

AERONAUTICAL SOCIETY OF GREAT BRITAIN.

AT the Council meeting on October 23rd, the following were elected to membership of the Society in the respective grades :—

Associate Fellows.

W. E. Dommet	W. J. Taylor.	Miss E. M. L. Keary
C. R. Taylor	C. C. Turner.	Capt. N. C. Spratt.

Members.

F. J. Camm.	E. Fairbrother.	E. Sparshott.

Associate Members

C. F. Campbell.	G. W. Pickett.	G. Budden.
P. Sidney.	J. B. Butler.	Mrs. Macalister.
C. P. Stride.		

Students.

J. Kenyon.	S. Humphries.	B. W. O. Townshend.

W. BARNARD FARADAY, Hon. Sec.

The New Session.

THE first lecture of the new session of the Aeronautical Society of Great Britain will be held on Wednesday November 14th, at the Institute of Civil Engineers at 8 p.m., when Major Green will deal with the Technical History of the Aeroplane. Major Baird, M.P., D.S.O., Parliamentary Secretary to the Air Board, will be in the chair.

This will be followed on November 21st, by a paper on the Wind Tunnel by Mr. J. K. Pannell, the meeting place being the Society of Arts, while Sir R. T. Glazebrook will be in the chair.

On December 5th, also at the Society of Arts, Dr. W. H. Dines, F.R.S., will lecture on "Meteorology in relation to Aviation." Sir Napier Shaw will be in the chair.

The lectures after Christmas will include :—"Design of Aeronautical Instruments," by Major Filon (Head of Instrument Department at the Air Board ; "The Standardisation of Small Aeroplane Parts," by Messrs. Isaacs and Mansfield ; "Long Distance Flying," by Major Green ; "Screws and Threads," by Capt. Bishop.

For the Young Idea.

ON Wednesday, January 2nd, Lieut. A. P. Thurston, D.Sc., will give a Christmas Juvenile Lecture on "The Aeroplane," illustrated with models and cinematograph. Col. O'Gorman, C.B., in the chair. Applications for tickets should be made to the secretary of the Aeronautical Society, 7, Albemarle Street, W. 1.

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Naval Air Service for Australia.

IT is understood that the Commonwealth Government is securing from the Imperial Government an expert naval flying officer to organize the Australian Naval Air Service.

Aeroplanes from Tasmania.

RECENT gifts from the overseas dominions include the funds for two battleplanes from Tasmania, a firm of manufacturers in Hobart subscribing £2,700 for one while a leading pastoralist gave £1000 towards the purchase of another battleplane, and the balance of the money required is being raised by public subscription.

Educational Lectures.

AT the request of the Air Board the Aeronautical Society have arranged, on the same plan as the highly successful educational lectures at Hendon last year, courses of educational lectures at the R.A.F. (South Farnborough), Birmingham, Coventry, Southampton, Bristol, Peterborough, Lincoln, Hammersmith, Norwich and Leeds. The lectures begin at South Farnborough on November 15th, and the first five courses are given below :—

Subject.	Lecturer.	Farnborough.	Southampton.	Hammersmith.	Bristol.	Birmingham.
History and development of the Aeroplane ..	Major Green	Nov. 15	Nov. 16	Nov. 19	Nov. 20	Nov. 21
The Aerofoil	Mr. Relf ..	22	23	26	27	28
The Airscrew	Mr. Fage ..	29	30	Dec. 3	Dec. 4	Dec. 5
The Modern Aeroplane..	Capt. Barnwell	Dec. 6	Dec. 7	10	11	12
Materials and Methods of Design	Mr. Boswall ..	13	14	17	18	19
History and Development of Airships	Lieut. Turner	20	21	31	Jn 8	Jan. 2
Materials and Constructions of Airships ..		27	28	Jan. 7	15	9
Stability and Control ..	Capt. Aston ..	Jan. 3	Jan 4	14	22	16
Aero Engines	Lieut. Irving	10	11	21	29	23
Meteorology and Navigation	Prof. Duffield	17	18	28	Feb. 5	30

In each case the lecture will commence at 8 p.m.

Applications for tickets should be made to :—Superintendent, Royal Aircraft Factory ; Mr. A. E. Astington, Austin Motor Works, Birmingham ; Dr. Hill, University College, Southampton ; Messrs. A. V. Roe and Co., Southampton ; Messrs. Gwynne, Ltd., Chiswick ; Mr. H. T. Cooper, the British Tramways and Carriage Co., Ltd., Clare Street, Bristol, or at the offices of the Society, 7, Albemarle Street, London, W. 1.

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To Readers—One and All.

THE editor of "FLIGHT" will at all times be pleased to consider original articles (illustrated or otherwise) on subjects directly or indirectly allied with aviation. All articles accepted will be paid for ; a high literary standard of writing is not essential ; it is the facts which matter. Practical explanatory articles are most acceptable. Diagrams and similar illustrations need only be rough sketches if necessary.

The British Air Services

"PER ARDUA AD ASTRA"

UNDER this heading are published each week the official announcements of appointments and promotions affecting the Royal Naval Air Service and the Royal Flying Corps (Military Wing) and Central Flying School. These notices are not duplicated. By way of instance, when an appointment to the Royal Naval Air Service is announced by the Admiralty it is published forthwith, but subsequently, when it appears in the LONDON GAZETTE, *it is not repeated in this column.*

Royal Naval Air Service.

Admiralty, October 30th.

C.P.O.—G. R. Ashton entered as Prob. Flight Officer, seniority Oct. 28th.

B. G. Blampied and H. O. Eichholz, both entered as Prob. Flight Officers Temp.), seniority respectively Oct. 25th and Nov. 5th.

C. W. Moorhouse (Temp.) and H. J. Paine entered as Prob. Observer Officers, seniority respectively Nov. 5th and 10th.

Temp. commissions as Lieut. (R.N.V.R.) have been granted to O. G. Wemyss and P. N. B. King, seniority Oct. 27th and Nov. 5th.

Admiralty, November 4th.

Lieutenant (Temporary).—J. G. Y. D. Morgan, promoted to Lieut.-Comdr. (Temp.), seniority Oct. 31st.

Flight Sub-Lieutenant (Temporary).—H. E. Parker, promoted to Flight-Lieut. (Temp.), seniority Oct. 1st.

Sub-Lieutenant (Temporary).—F. C. B. Lefroy, promoted to Lieut. (Temp.), seniority Oct. 31st.

Probationary Flight Officer.—F. H. Bell, promoted to Flight Sub-Lieut. (Temp.), seniority Oct. 24th.

The following have been entered as Prob. Flight Officers (Temp.), and all appointed to President, addl., for R.N.A.S. :—E. P. McIndoe, H. C. Maisey, S. M. Morris, C. Mortimer, F. A. Norman, H. A. Pank, A. H. Partner, W. A. R. Pepper, W. K. Prendergast, L. J. Quick, H. Randle, D. Reekie, D. A. Roberts, R. C. Rosser, W. D. Sambrook, R. F. Sanders, J. Scruton, G. B. Shillaker, H. P. Smith, R. W. Welsh, A. W. Tuckwell, S. S. Russell, O. St. Clair Parsons, H. C. Mills, J. D. Horgan, G. Buckley, E. R. Ayliffe, E. A. Appleby, J. O. Armes, J. R. A. Barnes, A. J. Barrett, W. I. Beckett, G. R. A. Booker, C. W. Bostock, M. S. Smith, W. J. Stevens, A. W. Stewart, B. Sykes, A. H. Thomas, E. R. Walker, J. M. Walmsley, C. Walter, J. L. Warmington, W. J. Watkins, F. W. Webster, W. Webster, R. Whincup, A. E. Wilson, L. N. W. Woods, A. C. G. Fowler, A. H. Fitton, G. B. Coward, E. C. Chesterton, W. A. W. Carter, L. W. Butchard, A. W. Brayley, C. H. Bridge, C. W. Brown, F. R. Carlin, J. M. Clarke, W. M. Cooper, E. H. Dixon, J. G. Dugdale, L. Edwards, W. D. Evans, J. A. Eyres, R. E. H. Gould, V. S. Gregg, S. Arston, E. G. Hayes, G. Heath, L. H. Higgins, L. C. Willman, E. R. Hiscocks, S. L. Hudson, W. G. Ilingworth, J. Kent, O. A. Kempe, J. M. L. Laidlay, W. S. T. LeMay, J. B. Lynch, M. F. McGregor, C. E. Usher-Somers, T. H. Bottomley, T. L. Harding, C. R. Harris, H. J. Clarke, W. Nesbitt, J. A. McFadden, V. S. Green, B. H. Stata, H. T. Coo, and W. B. Craig.

Messrs. A. T. Hopwood and C. W. Bishenden, entered as Prob. Observer Officer (Temp.) and Prob. Flight Officer (Temp.) respectively, seniority, Nov. 10th and 11th.

Admiralty, November 5th.

Probationary Flight Officers (Temp.).—W. P. Gibson, entered as Observer Officer (Temp.), with original seniority of June 10th ; and H. K. Moir, granted temp. commission as Sub-Lieut. (R.N.V.R.), seniority, Nov. 3rd.

P.O. (R.N.V.R.).—R. Knight, entered as Prob, Observer Officer (Temp.), seniority Oct. 29th.

O.S. (R.N.V.R.).—G. G. Austin, entered as Prob. Flight Officer, seniority Nov. 2nd.

W. L. E. Gard and W. H. Muirhead entered as Prob. Flight Officers (Temp.), seniority Nov. 12th.

B. Whitaker granted temp. commission as Sub-Lieut. (R.N.V.R.), seniority Nov. 12th.

Royal Flying Corps (Military Wing).

London Gazette Supplement, October 30th.

The following appointments are made :—

Flying Officers.—Temp. 2nd Lieuts. (on prob.), Gen. List, and to be confirmed in their rank :—C. Young ; April 17th. A. F. Woodward-Gregory ; Aug. 27th.

General List.—The following Equipment Officers, 2nd Class, to be Temp. Capts. while specially employed :—Temp. Lieut. E. R. Moxey, Gen. List ; Lieut. P. L. Hunting, North'd Fus. (T.F.) ; July 15th. The following from R.F.C., to be Temp. 2nd Lieuts. :—1st Class Air-Mech. J. A. Brandt ; July 31st. Flight Sgt. A. Y. Moncrieff ; Sept. 20th. Sgt. L. B. Hoyland ; Oct. 2nd. Sgt. L. A. Herbert ; Oct. 5th. To be Temp. 2nd Lieuts :—Cpl. G. W. Miller, from A.S.C., J. Gray, W. A. Carveth ; Aug. 1st. J. A. Miller, G. M. Smith, C. W. King, H. Gordon, G. A. Birks, W. B. Elliott, G. Gillanders, G. D. McLeod, L. W. Mason, A. R. Whitten, L. D. Harthorn, H. F. Dougall, W. G. Coutts, W. H. Collins, J. S. MacD. Browne, R. G. M. McRae, H. A. Vineberg, H. E. Stewart, W. V. Skall, H. E. Rachar, A. G. Makings, L. McFaul, F. A. Laughlin, H. L. Hammond, W. U. Hughes, K. B. Watson ; Aug. 13th. G. W. G. Gauld, J. H. Acton, J. H. McNeaney, R. H. Davison, I. W. Awde, A. C. Williams, M. G. Baskerville ; Aug. 21st.

Supplementary to Regular Corps.—Lieut. (Temp. Capt.) J. H. Kelly relinquishes his commission with a view to joining the American Army, and is granted the hon. rank of Capt. Lieut. F. L. Hambly relinquishes his commission with a view to joining the American Aviation Service, and is granted the hon. rank of Lieut. ; Oct. 31st. 2nd Lieuts. (on prob.) are confirmed in their rank :—G. G. A. Martin, G. Wallas, J. U. G. Lamond, W. Chapman, K. W. Cocking.

London Gazette Supplement, October 31st.

The appointment of Bt. Lieut.-Col. (Temp. Brig.-Gen.) F. H. Sykes, C.M.G., Hrs., as a Wing Comdr., notified in the *Gazette* of Feb. 1st, 1915, is antedated to Nov. 22nd, 1914.

The following appointments are made :—

Flight Commander.—2nd Lieut. (Temp. Lieut.) B. K. D. Robertson, Glouc. R. (T.F.), from a Flying Officer, and to be Temp. Capt. whilst so employed ; Oct. 19th.

Flying Officers.—Temp. 2nd Lieuts., Gen. List :—W. A. Carveth, J. Gray ; Aug. 3rd. G. A. Birks, W. B. Elliott, G. Gillanders, H. Gordon, H. L. Hammond, W. U. Hughes, C. W. King, F. A. Laughlin, G. D. McLeod, L. W. Mason, J. A. Miller, G. M. Smith, A. R. Whitten ; Aug. 17th. J. S. M. Browne, W. H. Collins, W. G. Coutts, H. F. Dougall, L. D. Harthorn, L. McFaul, R. G. M. McRae, A. G. Makings, H. E. Rachar, W. V. Skall, H. E. Stewart, H. A. Vineberg, K. B. Watson ; Aug. 21st. R. H. Davison, J. H. McNeaney ; Aug. 25th. G. W. G. Gauld ; Aug. 26th. I. W. Awde ; Aug. 27th. A. C. Williams ; Aug. 28th. M. G. Baskerville ; Aug. 30th. J. H. Acton ; Sept. 8th. Temp. 2nd Lieut. (on prob.) B. S. Johnston, Gen. List, and to be confirmed in his rank ; Oct. 7th. Capt. H. C. Sootheran, Canadian Mil. Forces ; Oct. 9th. Temp. 2nd Lieut. (on prob.) W. F. C. Powell, Gen. List, and to be confirmed in his rank ; Oct. 10th. Lieut. A. G. Vlasto, R.F.A., S.R. Temp. 2nd Lieuts. (on prob.), Gen. List, and to be confirmed in their rank : W. P. Southall, C. H. Brown, J. Cunliffe, J. G. Lovelace ; Oct. 11th. Temp. 2nd Lieut. W. Law, Cam'n. Highrs., and to be transfd. to R.F.C., Gen. List ; 2nd Lieut. V. G. Southern, M.C., York. and Lanc. R., from a Flying Officer (Obs.), seniority from Dec. 29th, 1916 ; Temp. 2nd Lieuts. (on prob.), Gen. List, and to be confirmed in their rank :—W. G. Warwick, W. Bevan, R. T. Pink, T. L. Williams, R. O. Phillips, Temp. Lieut. W. T. Breach, Gen. List, from a Flying Officer (Obs.), seniority from July 29th, 1916 ; Temp. Lieut. W. F. Hellyar, Gen. List, from a Flying Officer (Obs.), seniority from Oct. 8th, 1916 ; Temp. 2nd Lieuts. (on prob.), Gen. List, and to be confirmed in their rank :—G. W. F. Darvill, F. W. Norris, G. G. Newbury, F. W. Dogherty, W. J. Prior, Temp. 2nd Lieut. K. P. Ewart, Gen. List, from a Flying Officer (Obs.) (Oct. 12th), seniority from Oct. 26th.

Flying Officers (Observers).—Lieut. C. N. Milligan, Can. Mil. Forces, seniority April 14th ; Temp. 2nd Lieut. H. C. Black, High. L.I., seniority June 19th, and to be transfd. to R.F.C. Gen. List ; Oct. 11th. 2nd Lieut. P. Kershaw, L'pool R. (T.F.), seniority June 27th, and to be secd. ; 2nd Lieut. S. W. Mills, R.F.A. (T.F.), seniority July 16th, and to be secd. ; Aug. 15th. 2nd Lieut. E. G. Williams, Essex R., seniority July 23rd, and to be secd. ; 2nd Lieut. F. B. Whittaker, S. Lan. R., S.R., seniority July 23rd, and to be secd. ; Temp. 2nd Lieut. (on prob.) W. G. Hunnisett, Gen. List, seniority July 30th, and to be confirmed in his rank ; Temp. 2nd Lieut. R. M. Nicolls, R.A., seniority Sept. 4th, and to be transfd. to R.F.C., Gen. List ; 2nd Lieut. G. G. Preston, M.C., R.G.A., S.R., seniority Sept. 4th ; Oct. 11th.

Equipment Officers, 1st Class.—From the 2nd Class, and to be Temp. Capts. whilst so employed :—2nd Lieut. (Temp. Capt., without allowances) R. Holloway, S.R. ; 2nd Lieut. (Temp. Lieut.) W. G. Cleghorn, R.G.A. (T.F.) ; Temp. Lieut. M. O. Illingworth, Gen. List ; 2nd Lieut. (Temp. Lieut.) L. Davies, S.R. ; 2nd Lieut. (Temp. Lieut.) A. E. Squire, S.R. ; Temp. Lieut. H. Crouch, Gen. List ; Oct. 1st. Temp. Lieut. J. H. Smith, Gen. List ; Oct. 15th. Temp. Lieut. S. E. H. Orde, Gen. List ; Oct. 19th.

2nd Class.—From the 3rd Class :—Capt. T. I. Walker, Lond. R. (T.F.), and to be Temp. Lieuts. whilst so employed :—Temp. Qr.-Mr. and Hon. Lieut. A. A. Rowe, Gen. List ; Qr.-Mr. and Hon. Lieut. H. Farquharson (T.F.), Gen. List ; 2nd Lieut. W. A. Verner-Furlong, S.R. ; Temp. 2nd Lieut. P. M. H. Currie, Gen. List ; 2nd Lieut. F. D. Lugard, S.R. ; Oct. 1st.

General List.—Cadet H. Monks, from R.F.C., to be Temp. 2nd Lieut ; Sept. 24th. Izaak van Niekerk Reynecke to be Temp. 2nd Lieut. (on prob.) ; Oct. 15th.

Attached to Headquarter Units.

Staff Captain.—Temp. 2nd Lieut. E. J. Briscoe, Gen. List, R.F.C., and to be Temp. Capt. whilst so employed, vice Lieut. H. O'N. de H. Segrave, R. War. R.

London Gazette Supplement, November 1st.

The following appointments are made :—

Squadron Commanders.—From Flight Comdrs., and to be Temp. Majs. whilst so employed :—Lieut. (Temp. Capt.) E. H. Johnston, S.R. ; Oct. 15th. Lieut. (Temp. Capt.) B. E. Sutton, D.S.O., M.C., Yeo. (T.F.) ; Oct. 18th.

Flight Commanders.—From Flying Officers, and to be Temp. Capts. whilst so employed :—Temp. Lieut. R. H. Sharp, Gen. List ; Oct. 14th. Temp. Lieut. R. M. Wynne-Eyton, Gen. List, Temp. 2nd Lieut. W. Durrand, Gen. List ; Oct. 17th. Temp. 2nd Lieut. H. Turner, Gen. List ; Oct. 21st.

Flying Officers.—Lieut. J. F. Larson, Canadian Art. ; 2nd Lieut. (on prob.) G. H. Bush, S.R. ; Lieut. T. J. Denton, New Zealand Exped. Force ; Aug. 15th, July 12th. Temp. Capt. F. M. Hicks, Gen. List, from a Flying Officer (Obs.), seniority Sept. 16th, 1916. 2nd Lieut. A. D. Gledhill, Yeo. (T.F.), and to be secd. ; Aug. 17th. Lieut. H. J. Buchanan-Wollaston, Yeo. (T.F.), from a Flying Officer (Obs.) ; Aug. 18th, seniority Act. 20th, 1916. 2nd Lieut. W. S. Lighthall, Dorset R., S.R., and to be secd. ; Aug. 20th. Temp. Lieut. E. C. Mackenzie, Garr. Bn., York. R., and to be transfd. to R.F.C., Gen. List ; 2nd Lieut. R. G. Bishop, Lond. R. (T.F.), and to be secd. ; Temp. 2nd Lieut. H. Richard-de-Lescherry, attd. Worc. R., and to be transfd. to R.F.C., Gen. List ; Aug. 21st. 2nd Lieut. G. A. Paxton, R. Suss. R. (T.F.), and to be secd. ; Aug. 29th. Lieut. C. F. Moore, High. L.I. (T.F.), and to be secd. ; Lieut. H. A. Raffe, R.F.A. (T.F.), and to be secd. ; 2nd Lieut. G. R. Simons, Durh. L.I. (T.F.) ; 2nd Lieut. J. A. Beeney, Lond. R. (T.F.), and to be secd. ; Aug. 31st. 2nd Lieut. H. F. Gaynor, Lond. R. (T.F.), and to be secd. ; 2nd Lieut. C. L. J. Garrard, Midd'x R. (T.F.), and to be secd. ; Sept. 2nd. 2nd Lieut. R. B. M. Jenkins, R.F.A. (T.F.), and to be secd. ; Sept. 8th.

Temp. 2nd Lieutenants, General List.—H. Monks, F. G. Thompson, H. C. Wright ; Sept. 24th. W. D. Peock ; Oct. 1st. 2nd Lieut. A. T. Daw, Yeo. (T.F.), and to be secd. ; Oct. 6th. Temp. 2nd Lieuts. (on prob.), Gen. List, and to be confirmed in their rank :—D. J. W. Page, F. W. Rhude, E. O. Copas, G. R. Howsam, H. G. Ross ; Oct. 10th ; Lieut. F. V. Robinson, Can. Exped. Force. Temp. 2nd Lieuts. (on prob.), Gen. List, and to be confirmed in their rank :—J. W. Rhodes, C. L. Hurst, Capt. A. F. Hordern, S. Staff. R., and to be secd. ; Temp. Lieut. S. L. H. Potter, A.S.C., and to be transfd. to R.F.C. Gen. List ; 2nd Lieut. H. E. Galer, R.F.A., S.R. Temp. 2nd Lieuts. (on prob.), Gen. List, and to be confirmed in their rank :—A. G. Bathurst-Norman, W. Hughes, R. L. Clapp ; Oct. 11th. R. G. Pratt, R. T. A. Cupiss, C. C. Connochie ; Lieut. W. B. Andrew, Can. Exped. Force ; Temp. 2nd Lieuts. (on prob.), Gen. List, and to be confirmed in their rank :—R. V. Betts, W. J. Tarring ; Oct. 12th. 2nd Lieut. J. C. Morris, W. Rid. R., and to be secd. ; Oct. 13th.

Flying Officers (Observers).—Temp. 2nd Lieut. J. H. Booth, Gen. List ; Sept. 24th. Oct. 13th, seniority from July 22nd :—Temp. 2nd Lieut. K. F. Jones, Res. Regts. of Cav., and to be transfd. to R.F.C. Gen. List ; Temp. 2nd Lieut. (on prob.) C. H. Jordan, Gen. List, and to be confirmed in his rank ; Temp. 2nd Lieut. G. A. Pocock, Leins. R., seniority from July 24th, and to be transfd. to R.F.C. Gen. List ; Lieut. E. R. B. Playford, R.F.A. (T.F.), seniority from Aug. 6th, and to be secd. ; Oct. 14th. 2nd Lieut. S. H. C. Waller, Suff. R. (T.F.), and to be secd. ; Oct. 13th, seniority from Aug. 6th. Temp. 2nd Lieut. O. S. Hinson, R. Suss. R. ; Oct. 15th, seniority from Aug. 14th. 2nd Lieut. W. J. Borthistle, Muns. Fus., S.R., and to be secd. ; Oct. 13th, seniority from Aug. 22nd. 2nd Lieut. P. C. C. Martin, Notts and Derby R., and to be secd. ; Oct. 15th, seniority from Aug. 22nd. 2nd Lieut. B. G. Brown, W. York. R., S.R., and to be secd. ; Oct. 13th, seniority from Aug. 23rd.

Balloon Commander.—Graded as a Balloon Officer.—2nd Lieut. (Temp. Lieut.) W. Y. Walls, Arg. and Suth'd Highrs. (T.F.), from a Balloon Officer July 5th.

Park Commander.—Capt. C. G. Martyn, Mon. R. (T.F.), from an Equipment Officer, 1st Class, and to be Temp. Maj. whilst so employed ; Nov. 2nd.

Equipment Officers, 1st Class.—From the 2nd Class, and to be Temp. Capts. while so employed :—Lieut. C. G. Coe, S.R. ; Sept. 1st. 2nd Lieut. (Temp. Lieut.) C. H. Stevens, S.R. ; Sept. 22nd. Lieut. E. Graham, S.R. ; Nov. 2nd.

2nd Class.—From the 3rd Class :—2nd Lieut. E. Holloway, S.R., and to be Temp. Lieut. while so employed ; Sept. 7th. Capt. G. W. Swanson, Hamps. R. (T.F.) ; Sept. 22nd. Lieut. G. F. Lucas, York. R. (T.F.) ; Temp. Lieut. W. G. M. Nicholl, Gen. List ; Temp. 2nd Lieut. J. R. Nicholls, Gen. List, and to be Temp. Lieut. while so employed ; Oct. 1st. Lieut. M. C. Evans, S.R. ; Temp. 2nd Lieut. A. Ross, Gen. List, and to be Temp. Lieut. while so employed ; Oct. 5th. Temp. Lieut. T. E. Drowley, Gen. List ; 2nd Lieut. (Temp. Lieut.) H. V. Robbins, Bord. R. ; Oct. 6th. Lieut. R. F. Howard, S.R., and to be Temp. Lieuts. while so employed. 2nd Lieut. E. E. Cutts, S.R. ; Oct. 10th. 2nd Lieut. F. B. Nicol, S.R. ; Oct. 13th. 2nd Lieut. J. N. Stephens, S.R. ; Nov. 2nd. 3rd Class.—Temp. 2nd Lieut. (on prob.) J. Pell, Gen. List, and to be confirmed in his rank ; Sept. 2nd.

General List.—2nd Lieuts., S.R., to be Temp. Lieuts. :—L. S. Brander ; July 19th. J. A. Cote ; Sept. 27th. Temp. 2nd Lieuts. to be Temp. Lieuts. :—W. A. McMichael ; July 1st. E. B. G. Morton ; Sept. 11th. R. W. Ryan ; Sept. 21st ; W. E. Windover, Sept. 25th ; C. G. Scobie, Sept. 26th ; G. O. Johnson ; Sept. 27th. G. A. Firby, F. A. Nethercott ; Sept. 29th. C. W. Robinson ; Sept. 30th. J. B. Mulvey, W. H. Cameron ; Oct. 3rd. B. S. Johnston ; Oct. 7th. H. W. Turner ; Oct. 8th. Temp. 2nd Lieut. (on prob.) G. Dickson, Gen. List, is confirmed in his rank.

To be Temp. 2nd Lieuts. (Sept. 24th).—J. H. Booth, F. G. Thompson, Cdt. H. C. Wright, from R.F.C. To be Temp. 2nd Lieuts. (on prob.) :—M. P. McLeod ; Aug. 13th. J. L. Nairn ; Aug. 21st. S. H. Love ; Aug. 28th. C. A. McGillivray, W. A. E. Pepler, W. F. Purvis, H. F. Proctor, J. F. R. I. Perkins, T. J. A. Proudfoot, C. E. Perkins, E. S. Osborn, J. H. Morris, Y. A. McLean, J. N. B. McKim, C. J. W. McKeown, L. P. McHugh, G. A. Leckie, A. A. Leitch, T. G. Kernick, B. I. Johnstone, R. J. T. Jenner, O. R. Perkins, J. N. L. Millett ; Sept. 1st. W. G. L. Bodley, T. E. Gohl, E. A. Goodwill, J. Reid, E. A. Seymour, T. E. Roach ; Sept. 19th. Sgt. E. H. Newson, from R.F.C., F. R. Richardson, Sgt. B. F. Warburton, from R.F.C. ; Oct. 15th.

Cadets to be Temp. 2nd Lieuts. (on prob.) :—W. C. Burleigh, J. W. Cotter, T. L. Coates, R. T. Freeman, J. S. Hogg, T. H. Noble, H. Riches, H. M. Taylor ; Sept. 28th. P. W. Adams, H. C. Appleby, A. R. Aitken, W. R. Brown, E. G. T. Chubb, H. B. Davies, A. O. Fraser, W. A. Keeler, T. K. Ludgate, J. R. R. G. McCallum, E. Nicholls, E. S. Noble, G. H. Olney, C. D. Parker, C. G. Pugsley, H. G. Pope, S. Ramsden, E. W. Richardson, P. Rourke, W. Rowley-Redwood, E. W. Royce-Reddell, J. Spencer, F. B. Sagar, E. B. Selby, F. G. Smith, T. P. Speakman, A. Spotswood, C. Sunderland, A. Sykes, P. E. Turner, A. Taylor, J. E. Taylor, A. Dodd, T. Guinan, L. P. Jackson, V. Lowe, S. C. Player, F. E. Rix ; Oct. 12th. P. G. Addie, V. N. Bonnes, G. P. Cilliers, L. F. Copeland, V. G. Cuningham, L. J. Cox, H. C. R. Conron, F. J. Deane, D. N. Dickson, H. I. Dowell, S. E. Farson, A. B. Fish, C. Forster, O. L. Frampton, W. T. Fothergill, J. F. Good, J. E. Gordon, V. Harley, J. M. Holloway, H. C. Hunter, E. W. Hutchings, W. H. D. Knight, A. G. H. Lane, G. F. Lane, G. W. Lockhead, C. E. A. Lovell, C. E. Metcalf, J. A. Matthews, D. Marshall, W. H. Maxted, D. McGill, A. C. Macvie, D. Mackay, F. Ollenbittle, C. J. Orr. G. H. Patman, G. S. Peffers, A. H. Peters, L. C. Pitts, J. P. Pile, S. T. H. Roberts, A. D. Robinson, C. E. Rowley, J. C. Ruse, C. J. Sanders, R. Shillinglaw, J. B. Spence, W. S. K. Scudamore, F. C. Scott, A. C. R. Tate, P. J. Tattersall, H. Taylor, C. H. Tyreman, E. E. Whitelock, S. Wilson ; Oct. 21st. E. A. Alton, J. R. Anderson, W. L. Andrew, T. J. Arthur, P. W. R. Arundel, J. E. Bain, L. A. Barber, E. Barrett, E. Barnes, C. C. A. Beaumont, W. Beirne, A. McL. Blain, S. Braby, M. E. Bradley, V. Brimacombe, F. J. Brotheridge, A. E. Brown, J. R. Brown, J. H. H. Brunt, W. P. Bryden, A. Buchanan, W. S. Campbell, W. Campbell, A. E. Chapman, F. B. Champness, E. W. Christie, E. S. Clark, H. B. Clarke, H. W. Clarke, H. D. Coldwell, H. A. Cole, N. B. H. Cunningham, R. Ll. J. Davies, A. Dawson, C. I. H. Dawson, E. L. Day, W. W. J. Debenham, H. C. Derham, R. V. Dickins, R. I. Drake, G. M. Duncan, R. H. S. Eason, C. B. Edwards, E. P. Elliot, E. F. Erzinger, F. Fennell, E. S. Flatman, J. E. Forbes, W. Gardner, H. H. Gillingham, T. D. Goord, G. H. Grattan, H. S. Green, J. C. Green, G. L. D. Hall, J. G. Hamilton, N. H. Hamley, P. T. Harris, W. R. E. Hartfall, M. A. Hebb, C. R. Henderson, W. R. Henderson, G. Herring, W. F. Hiam, S. Hirst, J. B. Holbrook, F. M. Honore, G. H. Howarth, F. J. Hunt, C. B. Hunt, R. J. Hunt, J. G. Hunter, S. K. Isaac, C. C. Ivens, H. C. O. Jackson, A. N. Jackson, H. J. Jewell, J. L. Jewkes, R. F. S. Johnson, W. J. E. Johnston, C. P. King, J. R. King, C. F. Kirby, W. F. Knight, S. Laban, E. W. P. Lamb, E. E. Lewis, H. G. H. Lowe, J. O. MacAndrew, J. S. McCalman, A. R. McDonald, H. R. McDonald, A. Martin, W. J. Miller, A. E. Moir, H. B. Monaghan, S. R. Norcott, H. E. O'Hara, R. O'Neill, S. R. Painter, W. Parke, W. R. Patton, G. E. T. Payne, P. W. Penney, B. Pepper, J. F. S. Percival, E. A. Peters, A. Provan, F. G. Pym, R. Pyne, A. F. Quelch, F. C. P. Roberts, G. B. Rogers, C. F. Russell, W. R. Sanborn, W. J. Saunders, W. Shackleton, C. G. Shapland, T. E. Simpson, M. K. Smith, C. W. Snook, R. MacK. Soulby, D. Sharling, A. Spring, G. G. Stephenson, G. B. J. Stoddart, E. tSubbs, E. Telfer, D. U. Thomas, A. E. Thorp, F. W. J. Toolag, R. J. Twilton, A. E. Tyrrell, A. W. Vanderburgh, G. Wade, J. G. Walker, A. R. Wardle, J. L. Waugh, E. H. Westmoreland, J. H. Whitham, T. H. Wood ; Oct. 25th.

London Gazette Supplement, November 5th.

The following appointments are made.

Assistant Instructor in Gunnery.—(Graded as an Equipment Officer, 3rd Class).—Temp. Lieut. J. B. Roth, attd. Lan. Fus., and to be transfd. to R.F.C. Gen. List ; Sept. 5th.

General List.—To be Temp. 2nd Lieuts.—Tpr. S. D. Mason, from Z. Zealand M.G. Corps ; Jluy 31st. Cpl. H. P. Rasmussen, from New Zealand Mil. Forces (Aug. 1st. Sgt. A. Parrish, from New Zealand Mil. Forces ; Sgt. P. Nielsen, from New Zealand Mil. Forces ; Aug. 3rd. The following from R.F.C. to be Temp. 2nd Lieuts :—Actg.-Cpl. N. F. Burch, Sgt. A. N. Stratton ; Oct. 9th. to be Temp. 2nd Lieuts. (on prob.) :—T. H. Sills ; Oct. 19th. 1st Class Air Mech. R. E. H. Martin, from R.F.C. ; Oct. 20th.

Memoranda.—Warrant and N.C.O.'s, from R.F.C., to be 2nd Lieuts., while serving with R.F.C. :—Temp. Sgt.-Maj. A. E. Huoghton ; Aug. 25th. Sgt.-Maj. C. E. Cullen ; Oct. 9th. Sgt. H. J. C. White ; Oct. 11th.

Supplementary to Regular Corps.

2nd Lieut. H. R. Hodgson relinquishes his commission on account of physical unsuitability as a pilot or observer ; Nov. 3rd. 2nd Lieuts. (on prob.) confirmed in their rank :—G. H. Bush, F. H. Hall.

London Gazette Supplement, November 3rd.

Wing Commander.—The appointment of Capt. (Temp. Major) J. C. Halahan, Res. of Off., notified in the *Gazette* of Sept. 14th, is antedated to Aug. 28th.

Squadron Commander.—The date of the appointment of Major F. J. L. Cogan, R.A., is Aug. 22nd, and not as in the *Gazette* of Aug. 17th.

The following appointments are made :—

Flight Commanders.—From Flying Officers, and to be Temp. Capts. whilst so employed :—Lieut. H. St. C. Smallwood, Ind. Army Res. of Off. ; July 19th. 2nd Lieut. (Temp. Lieut.) D. G. B. Jardine, High. L.I. ; Oct. 20th. 2nd Lieut. (Temp. Lieut.) R. T. C. Hoidge, M.C., R.G.A., S.R. ; Oct. 22nd. The following Flight Comdrs. are graded for purposes of pay as Sqdn. Comdrs. whilst employed at a School of Special Flying ; Sept. 22nd. 2nd Lieut. (Temp. Capt.) E. J. L. W. Gilchrist, Lrs., S.R. ; Lieut. (Temp. Capt.) H. H. Balfour, M.C., K.R. Rif. C., S.R.

Flying Officers.—Temp. 2nd Lieut. W. R. Cox, M.C., Gen. List, from a Flying Officer (Ob.) ; Oct. 5th, seniority Dec. 23rd, 1916. Temp. 2nd Lieuts. (on prob.), Gen. List, and to be confirmed in their rank :—W. S. Matthews, D. J. Rollo ; Oct. 6th. E. F. H. Davis, G. G. Bailey ; Oct. 10th. H. J. Watts, C. F. Campbell, O. W. Frayne, L. R. Charron ; Oct. 11th. P. Hopcroft, I. L. Roy, G. A. Claypham, A. W. Macnamara, C. E. Lind ; Oct. 12th. G. W. Bulmer, E. G. A. Peskett, H. E. Petit, C. O. Bird, P. Allden, E. B. Hakeman ; Oct. 13th. Lieut. W. B. Ferrier, Canadian Mil, Forces ; Temp. 2nd Lieut. H. B. Mann, Gen. List, from a Flying Officer (Ob.), seniority Sept. 15th, 1916. Temp. 2nd Lieut. F. C. Gorringe, Gen. List, from a Flying Officer (Ob.), seniority Jan. 16th ; Temp. 2nd Lieut. H. A. Grover, Res. Regt. of Cav. ; Temp. 2nd Lieut. G. Hood, Res. Regt. of Cav. Temp. 2nd Lieuts. (on prob.), Gen. List, and to be confirmed in their rank :—W. L. Thomas, I. C. Dick ; Oct. 14th. Lieut. J. S. Robertson, Canadian Exped. Force ; Oct. 15th. Temp. 2nd Lieuts. (on prob.), Gen. List, and to be confirmed in their rank : H. Butler, H. E. Davies, L. de V. Wiener, A. E. G. Williams, C. B. Mellor ; Temp. 2nd Lieut. L. A. W. Clift, R. Fus., and to be transfd. to R.F.C. Gen. List ; Temp. Lieut. A. L. Quance, York. and Lanc. R., and to be transfd. to R.F.C., Gen. List ; Temp. 2nd Lieut. (on prob.) S. L. Tipple, Gen. List, and to be confirmed in his rank ; Temp. 2nd Lieut. R. Ritchie, Gen. List, from a Flying Officer (Ob.), seniority Oct. 21st, 1916 ; Oct. 16th. Temp. 2nd Lieuts. (on prob.), Gen. List, and to be confirmed in their rank :—J. L. Callie, F. Plummer, H. D. Barton, M. A. Rowat ; Oct. 17th. Lieut. H. V. Pendavis, D.S.O., Oxf. and Bucks. L.I., to take seniority (without pay prior to May 12th, 1916) from May 9th, 1915. The following Flying Officers are graded for purposes of pay as Flight Comdrs. whilst employed at a School of Special Flying :—Temp. Lieut. J. B. R. Langley, Gen. List ; Temp. Lieut. J. S. Williams, M.C., Gen. List ; Sept. 22nd. Rank of Capt. C. W. Bruce, Gord. Highrs., is as now described and not as in *Gazette* of Oct. 23rd.

Flying Officers (Observers).—Temp. 2nd Lieut. H. E. Austin, Midd'x. R. ; Oct. 17th, seinority June 27th. Lieut. S. L. McClenaghan, Canadian Art. ; Oct. 14th, seniority Aug. 7th. Temp. 2nd Lieut. W. J. Walsh, Conn. Rang., seniority Aug. 14th, and to be transfd. to R.F.C. Gen. List ; 2nd Lieut. H. A. Le Feuvre, N. Staff. R., S.R., seniority Aug. 18th, and to be secd. ; 2nd Lieut. (Temp. Lieut.) F. T. D. Steel, A.S.C., seniority Aug. 19th, and to be secd. ; 2nd Lieut E. H. Wilson, Notts and Derby R., S.R., seniority Aug. 22nd, and to be secd. ; 2nd Lieut. P. J. Cayley, Glouc. R. (T.F.), seniority Sept. 3rd, and to be secd. ; Oct. 17th. Oct. 17th, seniority Sept. 10th :—Capt. C. W. C. Wasey, R. War. R., and to be secd. ; Temp. Capt. T. Edwards, S. Af. Labour Corps ; Lieut. N. M. Sanders, Canadian A.S.C. ; Oct. 15th, seniority Sept. 23rd. Oct. 17th, seniority Sept. 24th :—Temp. 2nd Lieut. W. R. Hibbins, S. Wales Bord., and to be transfd. to R.F.C., Gen. List ; 2nd Lieut. G. V. Carter, K. Edward's Horse, S.R., and to be secd. ; Temp. Lieut. J. C. Brooks, R.W. Surr. R., and to be transfd. to R.F.C. Gen. List ; Temp. Lieut. A. S. Rayner, North'n R. ; 2nd Lieut. A. C. Garnons-Williams, M.C., S. Wales Bord., and to be secd. ; 2nd Lieut. A. B. Bennett, Sea. Highrs., S.R., and to be secd. ; Temp. 2nd Lieut. T. A. Lloyd, attd. Welsh R., and to be transfd. to R.F.C. Gen. List ; Temp. 2nd Lieut. (on prob.) G. Murray, Gen. List, and to be confirmed in his rank, seniority Oct. 21st, 1916 ; Aug. 5th. Temp. Lieut. W. N. Fraser, Rif. Brig., and to be transfd. to R.F.C., Gen. List ; Temp. Lieut. G. T. Stoneham, attd. R.W. Kent R., and to be transfd. to R.F.C. Gen. List ; Aug. 8th.

Balloon Company Commanders, graded as Flight Commanders.—And to be Temp. Capts. while so employed.—2nd Lieut. (Temp. Lieut.) W. Y. Walls, Arg. and Suth'd Highrs., from a Balloon Officer ; Oct. 8th. 2nd Lieut. (Temp. Lieut.) H. B. T. Hawkins, S.R., from a Balloon Comdr., graded as a Balloon Officer ; Oct. 18th.

Balloon Commanders, graded as Balloon Officers.—From Balloon Officers.—Major G. T. J. Barry, S. Wales Bord. ; Oct. 8th. Capt. D. W. Meredith, R.F.A. (T.F.) ; Oct. 16th.?

Balloon Officers.—2nd Lieut. F. Pratt, from an Equipment Officer, 3rd Cl. ; Sept. 29th. Lieut. A. Kiteley, R.A., and to be secd. ; 2nd Lieut. A. H. Forester, R.W. Surr. R. (T.F.), and to be secd. ; Temp. 2nd Lieut. N. Bark, K.O. Sco. Bord., and to be transfd. to R.F.C. Gen. List ; Temp. 2nd Lieut. (on prob.) J. A. Shearer, Gen. List, and to be confirmed in his rank ; Oct. 4th. Lieut. R. G. Graham, Canadian A.S.C. ; Temp. 2nd Lieut. W. C. Watson, attd. Durh. L.I. and to be transfd. to R.F.C. Gen. List ; Oct. 13th.

Equipment Officers, 1st Class.—Temp. Lieut. (Temp. Capt.) A. M. Thom, M.C., Gen. List, from a Flight Comdr., and to retain the rank of Temp. Capt. while so employed ; Aug. 13th. 2nd Lieut. (Temp. Lieut.) E. Holloway, S.R., from an Equipment Officer, 2nd Cl., and to be Temp. Capt. while so employed ; Sept. 8th.

General List.—2nd Lieuts. R.F.A., S.R., to be Temp. Lieuts. while serving with R.F.C. :—F. St. J. North, C. W. Hawker, M.C. ; Oct. 1st. Temp. 2nd Lieut. C. P. R. Holdcroft relinquishes his commission on account of ill-health and is granted hon. rank of 2nd Lieut. ; Nov. 4th. Surname of Temp. 2nd Lieut. H. S. Whitby is as now described, and not as in *Gazette* of Sept. 6th. To be Temp. 2nd Lieuts. (on prob.) :—W. R. Archibald, G. B. Foster, A. G. Tyrell ; Aug. 13th. M. E. Connelly, H. E. Dunseith, J. B. Guthrie, H. F. Hazell ; Aug. 21st. H. W. Hewson ; Aug. 25th. M. Gibson ; Aug. 26th. L. S. Farrell, B. V. Richardson ; Aug. 28th. E. J. Baynes, L. G. Bowen, N. M. Brown, E. C. Bridgman, E. A. Burn, L. M. M. Browne, F. A. G. Bishop, H. R. Cleveland ; Sept. 1st. R. H. Cowan, A. L. Code, C. W. Davison, G. D. Floyd, W. H. Fair, J. E. Ferrand, A. Gerow, J. T. Gibson, C. A. W. Gallagher, L. A. Hawkins, R. J. Harris, E. W. O. Hall, W. G. Holden, L. J. P. Roy, H. J. Richardson, H. E. Read, W. K. Swayze, H. K. Stevens, J. B. Saer, G. M. Saunders, D. G. Scott, N. L. D. Smith F. M. Squires, H. A. Tuckwell, V. Voss, F. A. Whittall, G. S. Wilkin, C. B. Whitney, H. D. West ; Sept. 1st. E. Hague ; Oct. 19th.

London Gazette Supplement, November 5th.

The following appointments are made :—

Flying Officers.—Temp. Lieut. H. Haslam, Manch. R., and to be transfd. to R.F.C., Gen. List ; June 26th (substituted for notification in *Gazette* of July 17th). Temp. 2nd Lieut. (on prob.) L. C. Hooton, Gen. List, and to be confirmed in his rank ; Aug. 31st. Temp. Lieut. A. D. Stewart, Gen. List ; Oct. 10th. Temp. 2nd Lieuts. (on prob.), Gen. List, and to be confirmed in their rank :—W. B. Banfield, W. R. Cutler, R. K. McConnell ; Oct. 13th. 2nd Lieut. (on prob.) G. Knight, S.R. Temp. 2nd Lieuts. (on prob.), Gen. List, and to be confirmed in their rank :—J. Anderson, D. S. Walsh, W. B. Green, G. R. Vickers, N. E. Gwyer ; Oct. 15th. W. F. R. Robinson ; Oct. 16th. C. Allen, L. Phillips ; Oct. 17th.

Assistant Instructors in Gunnery (graded as Equipment Officers, 2nd Class).—From Asst. Instrs. in Gunnery (graded as Equipment Officers, 3rd Class) :—Lieut. W. W. Moser, Bord. R., S.R., Temp. 2nd Lieut. Lt. O. Spain, Gen. List, and to be Temp. Lieut. whilst so employed ; Sept. 1st. Capt. G. H. Salaman, Linc. R. (T.F.) ; Sept. 5th. Capt. P. K. Paul, High. L.I., S.R., 2nd Lieut. F. Chisnall, W. Rid. R. (T.F.), and to be Temp. Lieut. whilst so employed ; Sept. 22nd.

General List.—Temp. 2nd Lieut. (on prob.) C. S. P. Marquardt resigns his commission ; Nov. 6th. Qr.-mr. and Hon. Lieut. E. J. Parker, M.C., to be Temp. 2nd Lieut. whilst serving with R.F.C. ; Aug. 20th.

Supplementary to Regular Corps.—2nd Lieut. H. Fuller-Clark resigns his commission ; Nov. 6th.

General List (R.F.C.).—Temp. 2nd Lieut. L. W. Boulter resigns his commission with a view to joining an Off. Cdt. Batn. ; Nov. 6th.

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A Zepp. over Switzerland.

ANOTHER infringement of Switzerland's rights on the part of Germany occurred on October 31st, when, according to a message from Geneva, a Zeppelin passed over Rorschach, on the Swiss side of Lake Constance.

AVIATION IN PARLIAMENT.

Air Raids and Insurance.

MR. FELL in the House of Commons on October 29th asked the President of the Board of Trade (1) if he is aware of the way in which persons insured against aircraft and bombardment damage are treated in respect of their claims when they have been agreed by the surveyors for the Government and the insured, and when they ask for payment of the agreed sum they are in some cases offered a reduced sum and informed by the solicitor for the Board of Trade that if this is not accepted their remedy is to present a petition of right against the Crown in the High Court; if it is suggested that this is to be the remedy for the recovery of small sums of money owing under this insurance scheme; (2) if he is aware of the delay that is taking place in the settlement of claims under the Government air-raid insurance scheme and the dissatisfaction which this is causing to insured persons who have suffered damage to their houses and property; will he say why the Government appoint surveyors to examine the premises and agree to the amount of the damage, and then when they have agreed to the amount they throw over their own surveyors and send down another from London, who seeks to reopen the question; and if this procedure meets with his sanction?

Sir A. Stanley: The vast majority of claims under the Government insurance scheme are paid when the assessor's report is received at the Government Office without further question. In a small percentage of cases it has been necessary to instruct a second assessor to inspect the damage and advise the Government either because the first assessor has considered the amount of the claim excessive and has been unable to come to an agreement with the insured, or because the War Risks Office were not satisfied that the first assessor had given sufficient attention to the question of damage not due to the risks covered by the Government policy or because of some technical insurance difficulty. It is open to claimants who are dissatisfied with the amounts offered to them to make further representations to the War Risks Committee, and such representations are always carefully considered. If a settlement cannot be arrived at in this way, it is still open to the claimant to proceed by petition of right.

Mr. Fell: Arising out of the very unsatisfactory reply, may I ask why the Government appoint a surveyor, and, after his report, pay no attention to it, and say that a petition of right can be brought when the man's property has been destroyed?

Mr. Faber: Do not the Government desire to give compensation without putting the people to abnormal cost?

Sir A. Stanley: I am afraid I cannot add anything to the answer I have given. The Government is entitled to take necessary precautions.

Mr. Fell: Will the right hon. Gentleman make inquiries in the matter?

Sir A. Stanley: Certainly.

Mr. Watt: Does a Department of the right hon. Gentleman, after having appointed an umpire, refuse to take that umpire's decision?

The Growth of the Air Service.

IN his speech, moving the supplementary vote of credit for £400,000,000 in the House of Commons on October 30th, Mr. Bonar Law, Chancellor of the Exchequer, said: Another cause of the increase is aviation. That is a considerable amount, and, of course, in what I am now saying it does not include the supply of aeroplanes. That comes under munitions. It represents only the increased personnel in consequence of the larger aviation programme.

Enemy Air Raids.

MR. LYNCH on October 31st asked the Prime Minister whether, in view of the fact that London has been of late repeatedly and successfully raided by aeroplanes and by Zeppelins, the War Cabinet has ever had in consideration a plan calculated to deal effectually with such enemy attacks; whether any changes have been made in the personnel of the Services controlling London's air defence; and, if so, whether he will make a complete statement on the point?

Mr. Bonar Law: I have nothing to add to the very full statements which have already been made to the House on this subject.

Mr. Lynch: Might I ask how far the Government is prepared to defend incapacity? Is it realised that incapacity means defeat?

Mr. Bonar Law: I think that is a difficult question to answer, but judging by my observation in this House, the hon. Member will be able to judge of it as well as myself.

Mr. Hogge: Will the right hon. Gentleman say now when the Government will be ready to introduce their proposals with regard to the Air Ministry?

Mr. Bonar Law: As I have said, I hope that this Bill will be introduced next week, but before it is introduced we desire that it should be carefully considered by the Army Council. As it happens, the Chief of the Staff is on the Continent, where he will be for most of this week, and that has caused the delay.

Flax Control Board.

MR. KELLY asked the Financial Secretary to the War Office whether, in view of the fact that representatives of the War Department, the Department of Aeronautical Supplies, the Admiralty, the Irish Department of Agriculture, the Scottish and Irish spinners, are all included in the Flax Control Board, but no representative of the Irish flax growers has been included, he will select such a representative and add his name as a member of the board?

Mr. Forster: Two representatives of the Irish Department of Agriculture are members of the Flax Control Board. It is not considered necessary—at all events at this stage—to add a direct representative of the Irish flax growers on the board.

Mr. Hugh Law: Is it considered, then, that the flax-growers have less interest in the proper working of the Control Board than the spinners?

Mr. Forster: No, Sir; because the Board of Control regulates the matter after the flax is grown.

Compensation for Air Raid Damage.

MR. DENMAN on November 1st asked the Joint Financial Secretary to the Treasury what degree of compensation will be given for material damage arising from enemy bombs and British shells, respectively, during air raids; and whether any difference will be made if the sufferer is insured?

Mr. Baldwin (Joint Financial Secretary to the Treasury): There will be an announcement made almost immediately of the full terms of the new Government scheme of air raid compensation and I would ask the hon. Member to await its issue.

Sir J. D. Rees: Is it conceded as a matter of principle that the subject is entitled to compensation for damages from the War?

Mr. Baldwin: That concession, if any, will be found in the terms that will be announced.

Sir J. D. Rees: Will so serious a matter be announced as a settled matter, or will this House have any opportunity of expressing an opinion upon it?

Mr. Baldwin: As a settled matter.

Compensation for Personal Injury.

MR. BILLING asked whether persons who have experienced personal injury or damage to property by anti-aircraft fire are entitled to the same compensation as those injured by enemy bombs; and whether the dependants of persons killed from shock, whether same is caused by explosive warnings, or our own defences, or enemy bombs, are entitled to compensation?

Mr. Bonar Law: Damage to property or personal injury is treated in the same way whether caused by enemy attack or our defence.

Mr. Billing: Will the right hon. Gentleman say when we may expect a clear statement from the Government as to the position of the people injured in air raids?

Mr. Bonar Law: A very clear statement was given by me in answer to the hon. Member for East Edinburgh some time ago.

Mr. Hogge: Can the right hon. Gentleman say whether in that respect the Government has yet made up its mind that when separate allowance is paid it will not be less than the amount paid in pension to the soldiers?

Mr. Speaker: That does not arise out of the question.

Pilots Removed from Service.

MR. BILLING asked the Under-Secretary of State for War if he can state how many certified pilots have been relieved of their commissions or otherwise removed from active service flying for personal or service reasons?

Mr. Macpherson: The number of graduated pilots who have been removed from active service flying within the past six months on personal grounds is four. All of them at their own request. The number removed for service reasons, including medically unfit, is 224; a large proportion of these are still employed in the Army.

The Work of the R.N.A.S.

IN his speech on naval policy in the House of Commons on November 1st Sir Eric Geddes, First Lord of the Admiralty, said the personnel of the Fleet before the outbreak of war was 146,000; to-day it is 390,000. In this is included the Royal Naval Air Service, which has alone increased from 700 to 41,000. The duties of the Royal Naval Air Service are varied, of great value, and of absorbing interest. Its great efficiency and gallantry in France are occasionally brought to public notice by reports of bombing expeditions and otherwise. But any statement on the Navy would be incomplete without a tribute to the Royal Naval Air Service in operations over the sea. They are the terror of the submarine, and during one month the aircraft patrol round the British coast alone is more than five times the circumference of the earth.

I think it may interest the House and instruct the public if I give some indication of what the Royal Naval Air Service alone has done in bombing behind the enemy lines in France. During September alone 64 raids were carried out on dockyards, naval depôts, enemy aerodromes, and other objects of naval and military importance in Flanders behind the enemy lines. No less than 2,736 bombs were dropped by the Royal Naval Air Service alone, totalling 85 tons of explosives. The figures for October are not yet completely tabulated, but are still greater. There is no doubt that these raids result in great material and moral damage, and on many occasions their effect is shown in the aerial photographs to be such as to hamper and restrict seriously the enemy naval, aerial, and military undertakings.

Government Air Raid Compensation Scheme.

MR. FELL asked the President of the Board of Trade if he is going to propose some cheaper method of settling questions of damages for small claims arising under the aircraft insurance scheme than by a Petition of Right against the Crown; and if he is aware that many poor persons are kept out of money owing them for damages because they have not the money to face the costs of such expensive procedure as is suggested to them by the solicitor to the Board of Trade?

The Parliamentary Secretary to the Board of Trade (Mr. Wardle): The statement that many poor people are kept out of their money by fear of expensive legal proceedings is, I believe, incorrect, but if the hon. gentleman will be good enough to give me particulars of the cases he refers to, they will be investigated.

Mr. Fell: Are there not cases in which the Board of Trade have told people that they must present a Bill of Right?

Mr. Wardle: I have no knowledge of it.

Mr. Fell asked the President of the Board of Trade if he proposes to continue the practice of sending a second assessor to inspect the damages incurred under the Government anti-aircraft insurance scheme where the first assessor of the Government has inspected the premises and agreed to the amount and the Government is not satisfied with its own assessor's valuation; and whether he is aware of the hardship caused by the extra cost thus thrown on the insured?

Mr. Wardle: As has already been explained to the hon. gentleman, it is only in a small number of cases that it is necessary to appoint a second assessor; but the right to appoint a second assessor must be retained, in order to protect public funds. No extra cost is thrown on the assured in respect of assessors' expenses, as these are paid by the Government.

Mr. Fell: Must there not necessarily be greater expense thrown upon the insured if the premises are inspected a second time by another man?

Mr. Wardle: I do not think so.

Mr. Watt: If the first assessor is appointed by the Department, why should not the Department abide by his decision?

Mr. Wardle: I believe it is necessary, sometimes, to have a second opinion.

Mr. Crooks asked the Prime Minister whether he is now in a position to make a statement on the subject of compensation for damage due to air raids?

The Chancellor of the Exchequer (Mr. Bonar Law): A scheme has been prepared for giving owners of property not exceeding £500 in value compensation for damage done by air raids and bombardment without payment of any premium. Owners of property exceeding £500 in value would be compensated up to £500 without payment of premium, provided that all value in excess of £500 is insured under the Government Insurance Scheme. The new scheme will take effect as from September 1st. It will be administered by a Committee under the chairmanship of Sir Thomas Elliott, and will be worked in close connection with the Government Insurance Scheme, which is under the superintendence of the Board of Trade. [Details of the scheme which has been circulated are given on page 1159].

Mr. King: Are arrangements being made for the prompt settlement of these claims?

Mr. Bonar Law: Yes; arrangements are being made to settle them promptly.

Sir H. Harris: Will steps be taken to make the scheme known by Royal proclamation or otherwise? May I as a member of the War Guarantees Committee express thanks to the Government?

Mr. Bonar Law: We shall take care that the scheme is publicly notified.

Mr. Billing: Is the Government returning all the premiums which have been paid?

Mr. Peto: Does the reply mean that all existing anti-aircraft policies should be reduced by £500 in order to render the concession effective?

Mr. Bonar Law: That is the effect of the announcement I have made.

Mr. Billing: Is the right hon. gentleman aware that the Government is returning these premiums, but is only returning those of over 15s., and does he not consider it only right and just that premiums under 15s., which are mostly those of poor people, should also be returned?

Mr. Bonar Law: I will make inquiries.

FLIGHT
& AIRCRAFT ENGINEER

AIRCRAFT WORK AT THE FRONT.

OFFICIAL INFORMATION.

British.

General Headquarters, October 30th.

"On the 29th inst. there were a few fine intervals, during which our aeroplanes observed for our artillery, and fired several thousand rounds from their machine guns at the enemy's troops in trenches and on roads. Over 100 bombs were dropped on hostile billets at Roulers and elsewhere during the day, and again at night. In air fighting four hostile machines were brought down, and one driven down out of control. Two of our aeroplanes are missing. On the night of 29th–30th inst. our machines again attacked the railway station and lines around Saarbrücken in Germany, and bombs were seen to burst with good effect. All our machines returned, though the weather conditions were exceptionally bad. This morning, at 11 a.m., 12 of our machines went further afield, and attacked the munition works and gasworks at Pirmasens, 20 miles beyond Saarbrücken. Bombs were seen to burst on the factories and on the gasworks with excellent results. Many photographs were taken. The weather was good, and all our machines returned."

General Headquarters, October 31st.

"On the 30th inst. a strong gale, with driving rain, prevented much flying being done, though our aeroplanes co-perated with the attacking troops on the battle front throughout the greater part of the day, and accomplished much successful artillery work.

"After midnight, when the weather suddenly cleared, our bombing squadrons dropped over 2 tons of explosives on Roulers and Ingelmunster stations, as well as on moving trains and hostile billets. One German machine was brought down in combat, and one of our machines is missing.

"Following on those of the night of the 29th–30th inst. and of yesterday morning, another raid into Germany was carried out by our machines last night. On this occasion the steel works and station of Völklingen [north-west of Saarbrücken] were attacked with excellent results. Direct hits were observed on the furnace and power house, and on a train.

"The weather, which was brilliantly fine during the early part of the raid, turned later to rain and snow. In spite of this, all our raiding machines returned except one."

Admiralty, October 31st.

"On the night of the 29th, the Royal Naval Air Service carried out raids on Sparappelhoek and Varssenaere aerodromes. Visibility was excellent, and accurate shooting was made.

"All machines returned safely."

Admiralty, November 1st.

"During October 31st a bombing raid was carried out by naval aircraft on Sparappelhoek aerodrome. Targets were partially obscured by clouds, making results difficult to observe. Many offensive patrols have been carried out, during which one hostile machine was shot down out of control. All our machines returned safely."

General Headquarters, November 1st.

"On the 31st ult. advantage was taken of the change in the weather, and both our own and the enemy's aeroplanes were in the air all day. Visibility was not very good and hindered artillery work, but a great deal of bombing was carried out by our machines and many photographs were taken. Our aeroplanes also co-operated successfully with the raid carried out by our infantry yesterday afternoon north-east of Loos (reported in last night's *communique*), firing several thousand rounds from their machine-guns, and dropping bombs on hostile troops in communication trenches. During the day 5 tons of bombs were dropped by us on Roulers, causing fires and explosions, and on many hostile billets. At night a further 2½ tons were dropped on aerodromes in the neighbourhood at Courtrai, the aerodrome at Gontrode, and railway stations at Roulers, Thourout, and Courtrai. Two trains were attacked from a low height; one of them was derailed, and the other completely destroyed. Enemy aircraft were more active and aggressive than they have been for some days, attacking our artillery bombing machines. In air fighting seven hostile machines were brought down. Nine of our machines are missing. To-day another successful raid was carried out into Germany. The munition factories at Kaiserslautern were attacked by two groups of six machines each. Cloudy weather impeded accurate bomb dropping. One of the groups encountered the enemy's defending scouts and brought one of the latter down. All our machines returned safely."

War Office, November 1st.

"*Mesopotamia.*—On the morning of October 31st our aeroplanes dropped bombs on the enemy's aerodrome at Kifri, with good results."

General Headquarters, November 2nd.

"On the 1st inst. very little flying was possible owing to the low clouds and rain. One of our pilots flew through the clouds, which were at a height of 200 ft., to Gontrode aerodrome and dropped two heavy bombs. The drizzle and heavy anti-aircraft fire prevented observation of the results. On October 31st our anti-aircraft guns shot down one of the enemy's bombing machines. This is in addition to the seven hostile machines already reported as brought down on that day."

General Headquarters, November 3rd.

"On the 2nd inst. unfavourable weather conditions greatly interfered with flying, and there is nothing to report."

War Office, November 3rd.

Salonica.—"During the past week our aeroplanes have bombed hostile camps and dumps on the Belashitza Mountain, at Cestovo (north-west of Lake Doiran) and at Ciftlidzik (south of the Rupel Pass)."

Admiralty, November 4th.

"During November 4th numerous patrols were carried out by the Royal Naval Air Service. One two-seater enemy machine was brought down in the sea, another two-seater driven down damaged, and a scout probably destroyed. A bombing raid was also carried out this afternoon on Engel aerodrome. Bombs were seen to fall among hangars and sheds in the aerodrome. The formation was attacked by enemy machines, two of which were driven down out of control. All our machines returned safely."

French.

Paris, October 30th.

"Hostile aircraft dropped bombs during the night on Nancy and the region to the north. One person was wounded. The damage was insignificant.

"During the night of the 29th German aeroplanes bombarded Dunkirk and Calais without causing loss of life among the population. During the same night several bombs were dropped on Belfort, three person, including a woman and a child, being wounded. This afternoon Saint Die was also bombed, one person being injured.

"Four German aeroplanes were brought down by our pilots, and 12 were obliged to land in a damaged condition during the 27th, 28th, and 29th inst.

"Last night our bombing aeroplanes dropped 2,000 kilogrammes (2 tons) of explosives on the railway stations and depôts at Lichtervelde and Git, in Belgium. Besides, the railway stations of Maizières-les-Metz, Longeville-les-Metz, Thionville, &c., received 7,000 kilogrammes (7 tons) of projectiles. A big fire broke out in the station of Maizières."

Paris, October 31st.

"Enemy aeroplanes last night dropped about 30 bombs on Dunkirk. Up to the present no casualties or damage are reported.

"On October 30th six enemy aeroplanes were brought down by our pilots. Four others fell in a damaged condition in their own lines.

"During the night of October 30th our bombarding squadrons dropped 7,700 kilogrammes (about 7 tons) of projectiles and explosives on the railway station of Thionville, Bettemburg (south of Luxemburg), Maizières-les-Metz, Longeville-les-Metz, Woippy, and Conflans, as well as on the railway station of Luxemburg. All the objectives were hit."

Paris, November 1st.

"Some enemy aeroplanes bombarded Calais during the night of October 29th and Dunkirk on the night of the 31st. Only slight damage was done. There were no casualties among the civilian population."

Paris, November 2nd.

"Yesterday (November 1st) two aeroplanes were brought down by our pilots and a third by our special guns. In addition seven enemy machines were forced to land in a damaged condition. Our bombing squadrons copiously sprinkled with bombs the railway station at Mülheim, the Schlettstadt aerodrome, the ammunition depôts at Rufach, and Wepereimphal, and the railway station at Thionville. As a reprisal for the bombing of Dunkirk 17 of our aeroplanes dropped 2,500 kilograms of bombs on the town of Offenburg, Grand Duchy of Baden."

Paris, November 3rd.

"In the course of the Malmaison battle our aviators, with great daring, attacked with machine guns the enemy's troops, bombarded railway stations and places of assembling, and took part in 611 aerial fights.

"Sixteen German machines were brought down and three captive balloons set on fire. In addition 50 German aeroplanes fell in the enemy's lines, the majority of them being completely destroyed.

"In the period between October 21st and October 31st 23 German aeroplanes were brought down.

"Twenty-one were brought down by our pilots and two by the fire of our anti-aircraft guns.

"In addition 28 enemy machines were seriously damaged and brought down in their own lines."

Paris, November 4th.

"During the evening of the 3rd inst. the region of Dunkirk received several bombs from aeroplanes. There were no casualties."

Italian.

Rome, October 23rd.

"On October 19th a group of light enemy units was sighted in the lower Adriatic. Italian aeroplanes and light warships were immediately sent to attack them, and the aeroplanes came into action, but it was not possible to come nto contact with the enemy's warships, because they hastily returned to their base at Cattaro. At the same time Italian airmen attacked and put to flight an enemy submarine west of Alvona."

Rome, October 26th.

"Ten enemy aeroplanes were brought down or forced to land by our aviators during yesterday."

Rome, October 28th.

"On October 23rd Italian seaplanes carried out an important reconnaissance over Trieste, returning safely. Two seaplanes reconnoitred over Pola, beating off enemy aeroplanes and successfully attacking an enemy destroyer between Parenzo and Rovigno."

Rome, November 4th.

"During the night of November 2nd–3rd our aviators flew over the left bank of the Tagliamento and destroyed various ammunition depôts which had not been evacuated during the withdrawal. Yesterday two German aeroplanes were brought down by our aviators at Oderzo and Codroipo."

Russian.

Petrograd, October 24th.

"On October 23rd in the sector of Sereth village, two enemy battleplanes attacked by surprise one of our captive balloons, bombarding it with incendiary bullets. The balloon fell rapidly to earth and was entirely burnt. The observer, 2nd Lieut. Polzoff, sprang out with a parachute and landed safely."

Petrograd, October 29th.

"On the Roumanian front, yesterday, at 12.35 p.m., the enemy, after an aerial engagement, brought down one of our machines, which fell in the village of Opritcheni (seven miles north of the village of Sereth). The aviators, Lieut. Potukhoff and Lieut. Kasatkin, were killed. On October 27th, in the Dobrudja region, our hydroplanes dropped 40 bombs on enemy detachments in the villages south-east of Tultchea."

Petrograd, October 31st.

"On October 28th our aviators dropped eight poods of bombs on enemy stores in the Worki-Welke-Tarnopol region. Enemy aviators, without causing damage, dropped 20 bombs on the station of Malinovka (16 miles north-east of Dvinsk)."

Petrograd, November 3rd.

"In the Stechnikowce sector, six miles north of Tarnopol, one of our machines was damaged by the enemy's artillery fire and was forced to descend in the enemy zone. Our infantry, however, saved the machine and its airmen."

Petrograd, November 4th.

"On the South-Western front, in the direction of Kamen-Kashirsk, on October 31st our airmen dropped eight poods (2 cwt.) of bombs on Polizy Farm, causing a fire to break out. In the region of the village of Solomno (12 miles south-east of Volochisk) an enemy aeroplane, having lost its way, alighted in the rear of our position. The airman, a commissioned officer, was taken prisoner."

German.

Berlin, October 22nd.

"Twelve enemy aeroplanes and one captive balloon were brought down yesterday."

Berlin, October 27th.

"Several enemy air squadrons on the night of October 24th attacked industrial districts of Lorraine, Luxemburg and the Saar. Five persons were killed and four wounded at Esch in Luxemburg, and one killed and six wounded at Saarbrücken. No military damage was done and the material damage was insignificant. Four aeroplanes were shot down by anti-aircraft fire or forced to descend.

"*Italian Front.*—Twenty-six aeroplanes have been brought down in the last two days."

Berlin, October 29th.

"Since October 22nd the enemy has lost 48 aeroplanes in aerial engagements and by our anti-aircraft fire. Three of these were brought down in home territory. Lieut. Müller shot down his thirtieth and thirty-first, and Lieut. von Bülow his twenty-second and twenty-third opponents."

Berlin, November 4th.

"During the last few days our battle airmen have increased the number of their aerial victories. Lieut. Müller put out of action his 32nd opponent, Vice-Sergeant-Major Buckler his 23rd, Lieut. Böhme his 21st, and Lieut. Bongartz his 20th."

Turkish.

Constantinople, October 28th.

"An enemy aeroplane was brought down by our artillery fire behind the enemy's front line."

Bulgarian.

Sofia, October 29th.

"On the west bank of the Struma, near Kopriva, Lieut. Eschwege brought down a captive balloon which fell in flames behind the enemy lines. This is his 17th aerial victory."

MAGNETO IGNITION.

VII.—THE B.L.I.C. H.L.8 MAGNETO.

WHILE many firms were thinking about the making of magnetos, those who guide the destinies of the British Lighting and Ignition Co. were acting, and the result is seen in the B.L.I.C. magneto—not forgetting the splendidly organised works where it is turned out. Experience tells, and it is indeed exemplified in the B.L.I.C. magneto, which although it is manufactured in a works only started a few months ago, is equal as regards material, workmanship and finish to the best of those which hailed from Stuttgart, before the war. Proof of this statement, if it were needed, would be found in the fact that although the factory was laid out with an eye to future growth, it is working at practically full capacity, and yet the demand is still for more.

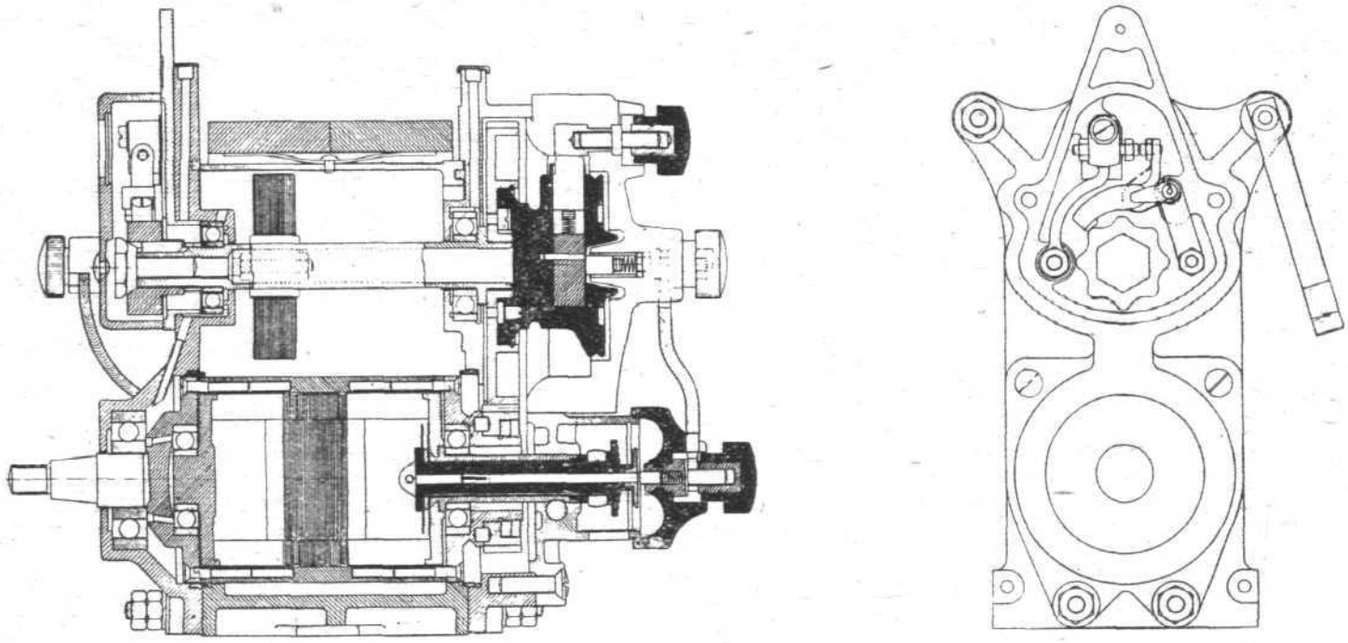
In all, one short of a round dozen of B.L.I.C. models are made, ranging from a small machine for rotary engines to a large magneto—which tips the scale at 63 lbs.—for eight cylinder gas engines. In this range there are several which are in use for aircraft work, but one which is most in demand at the present time is that known as the H.L. 8 type. This has several characteristic features, both as regards design and construction.

In the former connection it will be seen from the drawings that the machine is of the sleeve inductor type—the principle of which was described in Part IV in the issue of "FLIGHT" for October 18th. The armature is fixed, and a slotted sleeve rotates between the armature and the pole-pieces, the consequence being that four sparks are obtained during each revolution of the sleeve.

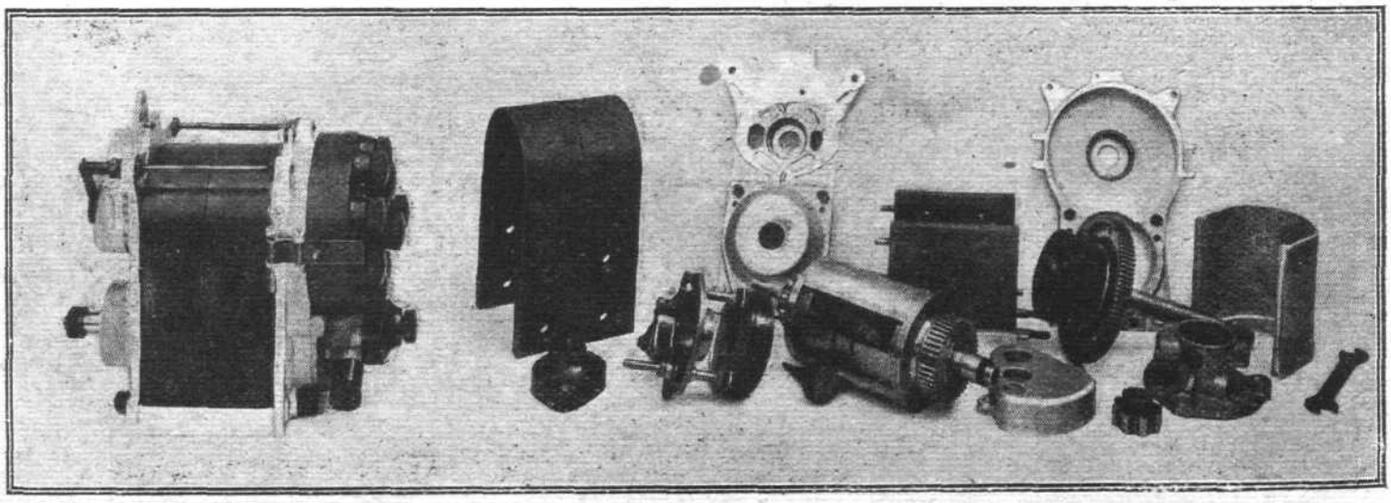
Another distinctive detail of the design of the H.L. 8 is the mounting of the L.T. contact breaker on the opposite end of the spindle carrying the H.T. distributor, an arrangement which makes for a certain amount of simplicity, as all the "breaks" are obtained during one revolution of the cam. The general arrangement of the contact breaker can be followed from the drawing which also shows how the condenser is mounted on the spindle between the magnets.

From the photograph showing the machine dissected and also from the drawing it will be observed that the B.L.I.C. is not nearly so complicated as many of the sleeve-inductor type of machine, which is the one great objection usually urged against their use. Further, although the magneto is not heavy, it is of very robust and substantial construction. a quality which makes for the reliability which is so necessary in aircraft work.

Another point—one which many other designers have apparently not appreciated at its true value—is that lubrication is a most vital matter, and really requires full consideration. It is a matter in which the B.L.I.C. really scores, for as may be judged from the sectional drawing the scheme of lubrication has been thought out in a logical way to ensure each working part receiving its due quota of lubricant.



THE B.L.I.C. H.L.8 MAGNETO.—Drawings showing the general arrangement.



THE B.L.I.C. H.L.8 MAGNETO.—On the left it is seen complete, while on the right the component parts are displayed.

FLIGHT
AIRCRAFT ENGINEER

SIDE-WINDS.

A HINT of the ever-growing activities of the Sunbeam Motor Car Co., Ltd., is afforded by the decision of the Board at its last meeting to appoint Mr. George F. Mortimer, A.C.I.S., Secretary of the Company, thereby releasing Mr. W. M. Iliff of that portion of the work and freeing him to devote his entire energies to his duties as Joint Managing Director with Mr. Louis Coatalen, Chief Engineer of the firm. Mr. Mortimer has ably assisted Mr. Iliff for the past seven years, during the last three of which he has acted as Assistant Secretary to the Company.

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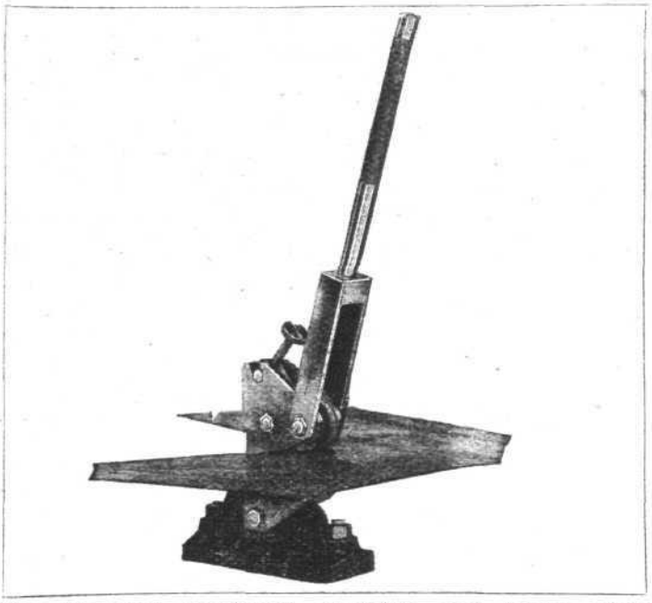
ECONOMY, both in time and material, is a strong claim for consideration in connection with the Tangent Patent self-feeding hand shearing tool, which is a speciality of Robert H. Lash, Ltd., of 29-31, Portugal Street, Kingsway, London, W.C. 2. It is a tool which can be used as a portable



The Tangent combined portable and bench steel cutter.

one, in which case it can easily cut sheets up to $\frac{5}{64}$ in. in thickness, or as a fixture, as shown in the illustration, when sheets up to $\frac{1}{8}$ in. thick for iron, brass, &c., or steel up to $\frac{3}{32}$ in. can be dealt with. Although the tool is very light—the weight is about 8 lbs.—it has great strength and the sheets are cut through without distortion or waste and without shock. The price of this tool is £4 17s. 6d. and the adapter for attaching it to the bench costs 7s. 6d. For dealing with steel up to $\frac{3}{16}$ and softer metals up to $\frac{1}{4}$ in. in thickness, a heavier type of machine is made. The leverage on this machine is adjustable, so that when cutting thin sheets the leverage may be reduced so as to increase the amount of rotation of the driven cutter at each stroke of the operating handle, whereby the machine is rendered quicker in action. The cutting speed ranges from 2 ft. 6 in. with the greatest leverage to 4 ft. 6 in. per minute for thin sheets. The price is £22 10s. Messrs. Robert H. Lash, Ltd., also make cutters specially for dealing with corrugated sheets.

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A MOVE in the aviation world which promises well is the joining up of Mr. F. C. Nestler with Mr. James Putman, the well-known tent maker of Aylesbury, where for the last two months he has been actively engaged in the construction of portable hangars of the "Nestler" type. Hangars constructed to Mr. Nestler's design are now very largely used by the Air Services, their success being largely due to their simplicity, durability, and great strength combined with rapidity and ease of erection. Splendid progress has been made, and important developments may be expected from the organisation of this firm, which employs over 1,500 workpeople, and whose workshops cover eight acres of ground. It should be noted that Mr. Nestler severed his connection with F. C. Nestler, Ltd., of Greycoat Street, Westminster, in June last, and he is no longer associated or connected with this firm in any way.

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NOVEL and useful are the handy little blotters which the Blackburn Aeroplane and Motor Co., Ltd., are sending to their friends. They are got up in four different styles, one giving cuff and shoulder markings of officers in the Royal Navy, another similar details with regard to the R.N.A.S., while the other two some of the principal British and Allied naval and military ribbons. Doubtless a card to the headquarters of the Blackburn Co. at Olympia, Leeds, will procure a set for anyone interested.

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IN connection with his "Thorough" classes, Mr. S. J. G. Andrews has arranged two courses of correspondence lessons in mechanical engineering, which should prove specially useful to aeronautical engineers. One of these deals with the theory of structures and design and the other with strength of materials, and each comprises 26 lessons. Where similar lessons occur in both courses, the graphical method of solution has been adopted in the structures course and the mathematical method of solution in the materials course. Students who are wanting educational facilities in this direction should write to Mr. Andrews at 80, Shakespeare Crescent, Manor Park, E. 12, for the syllabus of these courses.

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British Flying Officers Interned in Holland.

IT was officially announced at The Hague on November 4th that the four British occupants of a seaplane who were rescued on October 24th off the Dutch coast by a Dutch torpedo-boat have been interned.

America's Aviation Effort.

IN a statement issued by the U.S. War Department in Washington it is stated contracts have been let and work is now in progress on practically the entire number of aeroplanes and motors for which provision was made in the $640,000,000 Aviation Bill passed by Congress in July. This programme called for more than 20,000 aeroplanes. Approximately one-fourth of these are being made abroad, and the remainder are being constructed in this country. Every measure of insurance has been taken that the American forces in France shall be amply equipped with aircraft. There is practically no limit to the number of aerial fighters which the United States can and will furnish.

Prominent German Pilot Killed.

LIEUT. GONTERMANN, who was credited with having brought down 39 allied machines, was killed on November 3rd at Siegen aerodrome while trying a new machine. He had been decorated with the order Pour le Mérite.

A New German Bomber.

NEW aeroplanes with double motors and propellers, with which the Germans declare that they will make "surprising attacks" on England, are being practised with at the large new aerodrome at Coolkerke, north of Bruges, and at Zeebrugge, according to a frontier correspondent of the *Telegraaf*. It is added that the new machines require experienced handling, and many losses occur among the young airmen learning their management.

Silent Zeppelins.

ONCE again come reports from Geneva that the Germans are experimenting with a Zeppelin fitted with silenced motors. One of the new type is reported to have carried out trials, last week, over Lake Constance and dropped leaflets announcing the German advance in Italy.

German Raid Fears.

A MESSAGE from Cologne asserts that the valuable stained glass windows in the cathedral have been temporarily replaced by ordinary glass owing to fear that they might be destroyed by aerial attacks.

British Raid on Pirmasens.

A MESSAGE to the *Frankfurter Zeitung* from Pirmasens, a Bavarian town about twenty miles beyond Saarbrücken, reports that bombs were dropped on the town and environs. Some material damage was done, and the casualties were one killed and four wounded.

Other Raids into Germany.

THE *Frankfurter Zeitung* reports that at 3.30 p.m. on November 1st six enemy aeroplanes, coming from the west, appeared over Kaiserslautern, and dropped several bombs, without, however, causing any loss of life or material damage. It adds that the same day, enemy aeroplanes attacked Offenburg (south-east of Strassburg) and its environs. Two persons were killed and several injured at Schutterwald (south-west of Offenburg).

A German Machine in Holland.

ON the afternoon of October 31st, reports the Dutch *Telegraaf*, a German aeroplane landed at a short distance from Holten. The occupants, a naval officer and an N.C.O., who set fire to the machine, were arrested by a Dutch sentry and taken to Deventer.

COMPANY MATTERS.

Rolls-Royce, Ltd.

NOTICE is issued to the shareholders that after paying or providing for all trading expenses, liberal depreciation of buildings, machinery and plant, and after charging repairs and replacements to revenue, and writing down additions thereto to estimated post-war values, the trading for the year ended October 31st, 1916, has resulted in a nett profit of £82,640 8s. 10d., as compared with £44,171 9s. 1d. of the previous year. With £31,475 7s. 1d. brought forward from last year there is thus an available amount of £114,115 15s. 11d. At the meeting on March 9th last, the directors recommended for the twelve months ended October 31st, 1916, and the shareholders approved the payment of a dividend at the rate of 10 per cent. for the year (less income tax) which was subsequently distributed.

The directors recommend the following transfers:—(*a*) £20,000 to the Debt Guarantee Fund; (*b*) £30,000 to the credit of Income Tax Account; and (*c*) to carry forward £44,115 15s. 11d. The balance sheet and the notice convening the adjourned shareholders' meeting, will be issued shortly.

Aircraft Manufacturing Co. Issue of Shares.

THE British Foreign and Colonial Corporation announces that the off r at 21s. of 250,000 seven per cent. cumulative and participating "B" preference shares in the Aircraft Manufacturing Co. has been largely over-subscribed.

NEW COMPANIES REGISTERED.

ASSOCIATED AIRCRAFT, LTD., 97, New Bond Street, W.—Capital £25,000 in £1 shares (10,000 preference). Manufacturers of and dealers in aircraft and components, &c. First directors: Sir Charles E. Fryer and R. Taylor.

BLACKBURN PROPELLER CO., LTD., 96, Cross Street, Manchester.—Capital £20,000 in £1 shares. Aeroplane d signers and contractors, &c. First directors: V. Lightman, R. Barrow-Sierce, R. Blackburn and S. Lightman.

HOMERTON AIRCRAFT CO., LTD., Sherry's Wharf, Homerton Bridge, E. 9.—Capital £2,000 in £1 shares. First directors: E. Johnson and A. H. Sherry.

MORTLAKE AIRCRAFT CO., LTD.—Capital £10,000 in £1 shares. Acquiring business carried on at 37, Sheen Lane, Mortlake, as the "Mortlake Aircraft Co." Permanent governing director: J. Keele.

SUPER AVIATION CO., LTD., 154, Dalston Lane, E. 8.—Capital £10,000 in £1 shares. Aeronautical constructors, general engineers, seaplane and aeroplane manufacturers, &c. First directors: N. Bowman, A. A. Corre, N. Lowin and H. Freeman.

WALTON MOTORS, LTD.—Capital £200,000 in £1 shares. To purchase, or otherwise acquire and manufacture aero, motor and other engin s, &c. Under agreement with A.B.C. Motors, Ltd., and G. E. Bradshaw. First directors: R. L. Charteris, E. Noel and Squadron-Commander Marix, D.S.O., R.N.

BUSINESS NAMES REGISTRATIONS.

HURLINGHAM AIRCRAFT CO.—Registered October 16th, 1917. Manufacturers of aircraft, designers, merchants and transport contractors. 91c, Dynevor Road, Stoke Newington, N. 16. Partners, Harold Hurlin (British), 185, Church Street, Stoke Newington, N., and William Ingram (British), 74, Chippenham Road, Paddington, W.

MORANE-SMITH AVIATION CO.—Registered October 11th, 1917. Model aeroplane manufacturers and dealers, 21, Moring Road, Tooting Bec, S.W. 17. Proprietor: William G. Smith (British), same address. Other business occupation, employed in publishing department of *Daily Mirror*. Business commenced "some years ago."

LEGAL INTELLIGENCE.

Air Raids and Disease.

AT a London County Court on October 30th, twelve women claimed awards against their employer, under the Workmen's Compensation Act, for injuries sustained as a result of the air raid of June 13th. Their case was that when they resumed their work as cap makers after the raid their hands came into contact with some powder dispersed by a bomb which had exploded near by. This powder had got on the cloth, and they contracted dermatitis, which incapacitated them for some time. It was intimated that an admission of liability had been received and a settlement arrived at.

CORRESPONDENCE.

"To Remove Krupps."

[1952] In reference to your note in this week's "FLIGHT" regarding a report that the Krupps works at Essen are to be removed to Posen in East Prussia, this is not strictly correct. Krupps already control coal and steel mines in the neighbourhood of Posen and they are certainly developing these works in preference to the Essen works which have already reached the limit of their capacity.

There is another matter which has, however, apparently been overlooked, and that is the transference of the artillery and small arms works from Essen to Munich in Bavaria.

Early in 1916 it was announced that the Krupp interests had acquired large tracts of land in the vicinity of Munich for the building of new works. I have on file somewhere details of the negotiations, the district being an absolutely undeveloped one. Krupps immediately proceeded to link up with the main railway line, to lay down water and irrigation plant and to do everything on a scale worthy of Krupp.

The Munich Municipality at the same time acquired large tracts of land in the neighbourhood to prevent speculation, and started to re-sell in smaller parcels for putting down smaller works—which always crop up in the neighbourhood of large works—and for town planning, though Krupps always plan and lay out their own workmen's dwellings. The object of the Municipality was to create a local industrial district similar to Essen, with the advantage of cheap electric power from the new State power scheme, to be centralised round the new big "Bayernwerk," utilising the water of the "Walchen See."

A recent report in *Stahl und Eisen*, dated July 26th, 1917, gives some interesting details of the progress of the constructional work on the new buildings, some of which are reckoned to be in operation before the end of the year.

From this report it would appear that it is now intended to transfer the *whole* of the manufacture of artillery—including presumably heavy guns—to the Munich works, whereas the original intention appeared to be to confine it to the lighter artillery and small arms.

An interesting sidelight is thrown on the internal politics of the German Empire by the statement that one of the chief factors influencing the decision of the choice of Bavaria for the site of the new works, was the desire to create a local munitions industry in South Germany, in order to stimulate interest in war and warlike preparations.

To anyone who has lived in both North and South Germany, as I have, this is very significant, almost as significant as the offer of the Imperial Chancellorship to Hertling, one of the greatest thorns in the side of the Prussian militarist party.

FREEMAN HORN.

Nov. 3rd.

Aeronautical Patents Published.

Applied for in 1916.

The numbers in brackets are those under which the specifications are printed and abridged, &c.

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